THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

JANUARY, 1899.

A CASE OF ERYTHROMELALGIA,

WITH MICROSCOPICAL EXAMINATION OF THE TISSUE FROM AN AMPUTATED TOE.[1]

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It is known to neurologists that in 1872, and again later, one of the authors of this paper described cases of red neuralgia, and spoke of it as an unrecognized disease. Since then he has reported many cases. In this country the diagnosis has been disputed or the disease has been confused with Raynaud's malady. In the text-books it has frequently been hopelessly misunderstood. In France, however, a treatise (Lannois) was published upon it at an early date, and in England and, of late, in Germany it is fully accepted as a distinct malady by certain writers. It is now too well known to make a detailed description necessary. In its purity of type it must be seen in the younger adult. In older persons there are variations such as our present patient offers. In young cases there may be no pain and no flush when the limb is in

[1] Read at the twenty-fourth annual meeting of the American Neurological Association, held in New York, May 26, 27, and 28, 1898.

a horizontal position, but the arteries throb, the temperature rises, and the redness becomes intense when the foot is pendent. In old cases and older people the temperature obeys the normal law and falls when the foot is down, and the flush and pain are less surely absent from the elevated foot. The tenderness, also, in these aberrant types is not so very much increased by pendency as is the case when the disease is more recent.

J. C., a merchant, married, aged sixty-one years, has had neither syphilis nor gonorrhœa. He is said to have had typhoid fever at the age of twenty, again in 1863, and once more in 1865. In June, 1863, he was in the army, was captured, and spent ten months in Libby prison. In August, 1864, he had a sunstroke, was unconscious eight hours, and has remained sensitive to the heat of the sun since that time.

He had fair health until 1897. In July of that year he began to have limited areas of savage pain in the right foot, with tenderness and intense flush when the limb hung down or was used. The disturbances were noted in various parts of the sole and toes, lasting for months in certain localities, and always with extensive flushes.

While the fourth and fifth toes were thus disordered, a small, deep, painful ulcer came on the outside of the fourth toe and healed slowly. After three months these toes seemed to be nearly well, and the second and third toes were furiously attacked. As, in turn, these parts improved, the great toe was similarly seized with violent pain, and has remained in this state, the former seats of disease having lost all active pain and nearly all tenderness. Cold relieved the pain, but heat made it worse. To raise the foot above a level eased the pain; to let the foot hang down made the pain worse; to stand or walk made it unendurable.

Dr. William A. Dickey, of Tiffin, Ohio, recognized the disorder and brought Mr. C. to consult one of us (Dr. Mitchell). He was examined by Dr. J. K. Mitchell, whose notes are used with those of Dr. Harrison, the resident at the Infirmary for Nervous Diseases.

The great toe was slightly red, but not swollen. More or less pain was felt at all times, and of late the pain was worse during the day. Handling, pressure, heat, pendency, walking, increased the pain enormously, and with it the redness. He was using morphine freely, but slept very little. He was very nervous, and feared to be touched anywhere on the painful foot. He did not seem to have any real discomfort from pressure except in the great toe.

The heart was very feeble. A faint rhythmic murmur was heard at the apex. The heart-beat was so feeble as to make the results of the study doubtful. The arteries were soft, and no excess of tension was noted. A slight arcus senilis was observed. The urine was negative.

The affected limb was strong and not wasted, and no tenderness was found over the trunks of the nerves. The right knee-jerk was + +, and successive hammer blows caused frequent repetition of response. The left knee-jerk was +, but no ankle clonus was obtained. The ankle-jerks were excessive. Urination and defecation were normal.

The patient could localize touch, could feel pain when stuck with a pin, and could distinguish extremes of temperature in all parts, even in the painful foot. It was impossible to examine him with the com-

passes, on account of the pain caused by the attempt. No disturbance of sensation for touch and pain could be found in the buttocks, perineum, external genitalia, and thighs. The pain experienced by the patient was intense, and many remedies had been tried in vain. The disease seemed to be limited to the great toe. The whole right foot appeared to be somewhat larger than the left, and the instep arch was less well formed. In the great toe alone all the symptom-peculiarities found in an advanced case and in a patient past middle age were observed. A small ulcer was present beneath the toe-nail of the great toe. The diagnosis was clear.

Little benefit has been obtained in cases of this disease until one of us (Dr. Mitchell) cured radically a case in a young man by stretching the posterior tibial nerve and cutting the musculo-cutaneous and the fillets of the external saphenous nerve. The result was a complete cure and permanent freedom from pain.

In the next case presenting itself an operation was decided on with entire confidence.

The patient was forty-two years old, and a man of good and active habits. Drs. Morris J. Lewis, J. K. Mitchell, and S. Weir Mitchell examined the man with unusual care, and found no reason to suspect organic disease. The details of this report have been given elsewhere.[1] Both of these cases were of traumatic origin. The operation in the second case was precisely like that in the successful one, but it resulted in gangrene. The patient was removed by his friends to a homœopathic hospital, and died there on the table while undergoing amputation. No satisfaction was given as to the pathological condition, but it was learned that the walls of the small arteries were much thickened. No information was obtained concerning the nerve-ends. The portions of the nerve-trunks removed by Dr. Morton, who operated, were in perfect health. No indications of truncal neuritis were observed.

The patient J. C. had this peculiarity: the circulation in the left leg was good, but in the right leg below the groin neither Dr. Morton nor Dr. Weir Mitchell could feel an arterial pulse. Dr. John K. Mitchell, while taking the notes, felt the beat of the posterior tibial artery, and tested it as compared with the ulnar pulse. The vessel certainly could not be normal, and this conclusion, drawn from clinical observation, has been fully confirmed by the high degree of arterio-sclerosis found at the microscopical examination. This condition of the arteries, with the fate of the patient just mentioned, rendered unwise a stretching of nerves which innervated a territory larger than that occupied at the time by the disease. It was resolved to amputate the toe and half of the metatarsal bone; this was done on April 3, 1898, by Dr. T. G. Morton, without tourniquet or rubber bandage. The arteries jetted freely. The wound was closed as usual.

Mr. C. complained next day of pain in the wound, but this gradually lessened. On April 8th the lower fourth of the wound opened with a slough half an inch long, but not deep. The dead part came away very slowly, and the wound healed tardily.

Ever since the operation he has complained at times of having some pain in the ball of the foot, and has certainly some reddening of the toes, with pain. He thinks the pain is "different," and that he is

[1] Mitchell. Clinical Lessons on Nervous Diseases.

better. We are not so very sanguine as to his future freedom from pain, and the caution which limited the operative procedure was wise.

The report of this case has been given briefly, because the subject of operation has been discussed in the *Clinical Lessons*, and because Dr. Dickey will report the case more fully after some months have elapsed.

The findings in this case are of the most interesting character. The nerves of the great toe are intensely degenerated. Teased and stained in the fresh state with osmic acid, or stained with osmic acid and cut with the microtome, they show scarcely any nerve fibres; so few, indeed, that we hardly dared believe the findings could be correct until

FIG. 1.

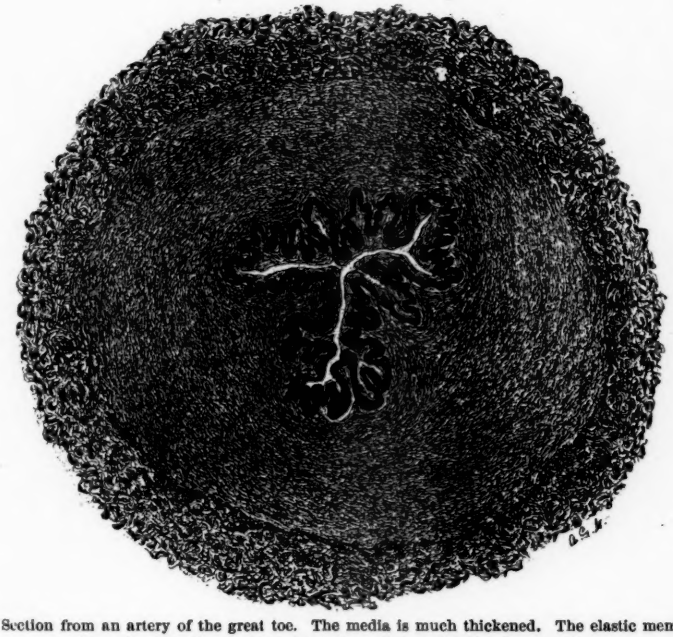
Transverse section of a nerve bundle from the great toe. The connective-tissue sheath is thickened and the nerve fibres are almost entirely degenerated; only four or five normal nerve fibres are seen.

we had confirmed our observations by sections of nerve fibres hardened in formalin and stained by Weigert's hæmatoxylin method. The nerve bundles are composed almost entirely of connective tissue; here and there in a longitudinal section one, two, or three fibres stand out distinctly from the light background of connective tissue, but even these nerve fibres exhibit irregular segmentation of the myelin. In transverse sections hardly more than three or four nerve fibres, with axis cylinders and medullary sheaths, may be seen in a nerve bundle, and

in some bundles no nerve fibres at all are found. The connective tissue about these bundles is much thickened. The smallest fasciculi are entirely degenerated. This cannot be due to faulty technique, for the results obtained by osmic acid are the same as those obtained by Weigert's hæmatoxylin stain, and in using the latter method care has been taken to avoid too great decolorization. We have not been willing to depend on Pal's modification of Weigert's stain, as nerve fibres by the former method are frequently too much decolorized.

The vessels are no less interesting than the nerves. The media in the vessels of quite good size is thickened and the intima is intensely pro-

FIG. 2.



Section from an artery of the great toe. The media is much thickened. The elastic membrane is wider than in normal arteries and shows hyaline degeneration.

liferated, so much so that it projects into the lumen of the vessels in great (microscopically speaking) masses of unequal size, and in some places nearly closes the lumen. In some of the smallest vessels also the lumen is almost obliterated by the proliferated intima. In one vessel, the largest we could find, the fenestrated membrane is hypertrophied to several times its normal size and presents a hyaline appearance; in another section this membrane appears to be multiplied. In

one place the overgrown intima projects into the vessel almost like a tumor, still attached only at one end. In another the lumen of the vessel seems to be enlarged at the expense of one side of the vessel's walls, as though an attempt had been made to restore the normal space by lateral enlargement. In some portions of one vessel the media is much more thickened than the intima. The walls of the veins are also thickened.

The bones of the great toe are larger than those in a normal adult skeleton. Our attention has been directed to this, inasmuch as Staub[1] was able to observe in erythromelalgia acute, very painful swelling of

FIG. 3.

Longitudinal section of nerve bundles from the great toe. The nerve fibres are entirely degenerated, with the exception of the very few which are stained a deep black.

the phalanges, and of the ends of the bones in the affected parts, and after the acute stage had passed the enlargement of the bones was less noticeable, but still perceptible.

Lewin and Benda in 1894 collected all the cases of erythromelalgia they could find in the literature, numbering about forty-one; but none

[1] Staub. Monatshefte für praktische Dermatologie, 1894, vol. xix. p. 10.

of these, as far as we can judge from the abstracts given by these writers, were with microscopical examination of tissue. From a study of these cases Lewin and Benda[1] concluded that the symptom-complex known as erythromelalgia is not a disease *sui generis*, but occurs with various cerebral and spinal maladies, in neurasthenia and hysteria, as a manifestation of neuralgia or neuritis, or as a reflex disease. Most authors, they say, regard it as a vasomotor neurosis, but this seems to us to be a very insufficient explanation. We have directed our attention to the literature which has appeared since the date of this paper.

Heimann[2] reported two cases in which the disease was limited to the distribution of the radial nerve. He believed that the cause was a vasomotor neuritis. No examination of tissue was made. The etiology of one case was alcoholism, exposure to cold, and hard manual labor; in the second case influenza may have played a rôle.

Eulenburg[3] regards erythromelalgia as a symptom-complex probably due to central disease, and not as an independent affection. The central origin does not exclude a simultaneous involvement of the peripheral nerves. The lesion is probably chiefly in the posterior and lateral portions of the spinal cinerea.

Bernhardt[4] speaks of the resemblance of erythromelalgia to acroparæsthesia. Paræsthesia is common to both, but in the former the skin becomes red, and often swelling of the affected part is noted; the local temperature is elevated, and hyperidrosis and local bleeding are not rare. At times gastro-intestinal disturbance, migraine, ataxia, unconsciousness, organic ocular diseases, or muscular atrophies are observed, and the disease is more common in men. It differs very considerably, therefore, from acroparæsthesia.

Rost,[5] in presenting a case of erythromelalgia in the *Verein für innere Medicin in Berlin*, March 7, 1898, remarked that the disease is exceedingly rare, and that it has only received general recognition in Germany within the last few years, although it was described by Weir Mitchell in 1872. When Gerhardt, Senator, and Bernhardt each presented a case in 1892 at a meeting in Berlin, the subject attracted much attention. Rost is rather inclined to regard erythromelalgia as a *morbus sui generis*, although he had no microscopical findings to report.

Clinical cases of erythromelalgia have been reported since the pub-

[1] Lewin and Benda. Berliner klin. Wochenschrift, 1894.
[2] Heimann. Ibid., 1896, p. 1135.
[3] Eulenburg. Deutsche med. Wochenschrift, 1893, p. 1325.
[4] Bernhardt. Die Erkrankungen der peripheren Nerven, Nothnagel's System, vol. xi., Part II., p. 446.
[5] Rost. Deutsche med. Wochenschrift, 1898, No. 13.

lication of the paper by Lewin and Benda, by Nieden,[1] Staub,[2] Lévi[3] (one of whose cases was due to hysteria), Fischer,[4] Schenk,[5] Pezzoli,[6] Weir Mitchell,[7] Elsner,[8] Finger,[9] Pospeloff[10] (with syringomyelia), and Prentiss.[11] Other cases, references to which are given in the *Index Medicus* from 1894 to 1898, but which are not accessible to us in the original form, have been reported by Dünges, Bignone, Nolen, Christiani, Pajor, De Sanctis, and Vannini. It is likely that we have been unable to find all the cases reported, but the number as given is quite large.[12]

Of considerable interest is the case reported by Dehio, inasmuch as a portion of the trunk of the ulnar nerve was examined. Dehio states that the hyperæmia, hyperidrosis, trophic disturbances of the skin, and the pain in the left hand of his patient suffering from erythromelalgia might have been due to peripheral disease of the nerves, but he is not inclined to accept the theory that only the most peripheral parts of the nerves of the hand were affected. If the symptoms were due to neuritis, muscular atrophy and reaction of degeneration should have been found, but were not. Muscular atrophy, however, was not observed in the great toe of our patient. He believes that the disease must have had its origin in the centres from which the nerves of the hand arise. A piece of the ulnar nerve 4 cm. long, and a piece of the ulnar artery of the same length, were excised, but not the slightest pathological change could be found in the nerve when this was examined microscopically. The adventitia and media of the ulnar artery were normal, but the elastic membrane formed a hyaline band, and the intima was thickened, reducing the lumen of the vessel to about half its normal size. These findings in the vessel are not unlike those in our case.

Dehio[13] thinks that erythromelalgia is the effect of abnormal irritation of the nervous system, and that the lesion is located in the posterior and lateral horns of the cord. It may be just as well to add that neither the most peripheral portions of the nerves nor the central nervous system were examined in Dehio's case.

About a year after the excision of a portion of the artery and nerve had been made above the wrist, Dehio's patient is said to have

[1] Nieden. Archiv für Augenheilkunde, 1894, vol. xxviii.
[2] Staub. Monatshefte für praktische Dermatologie, 1894, vol. ix.
[3] Lévi. Archives de Neurologie, 1895, vol. xxix. p. 168. La Presse Méd., Sept. 15, 1897.
[4] Fischer. St. Petersburger med. Wochenschrift, 1895, p. 70.
[5] Schenk. Wiener medizinische Presse, 1896, No. 45, p. 1401.
[6] Pezzoli. Wiener klinische Wochenschrift, 1896, No. 53.
[7] Weir Mitchell. Clinical Lessons on Nervous Diseases.
[8] Elsner. Neurologisches Centralblatt, 1897, p. 1024.
[9] Finger. Annales de Dermatologie et de Syphiligraphie, 1897, third series, vol. viii. p. 91.
[10] Pospeloff. Idem. p. 922.
[11] Prentiss. A paper read before the Association of American Physicians, May 4, 1897.
[12] References to other cases may be found in the Index Medicus for 1898.
[13] Dehio. Berliner klin. Wochenschrift, 1896, No. 37, p. 817.

scarcely complained of pain at all, and to have been able to use the hand for light work. This result, it seems to us, could hardly have been attained if the symptoms had been due to disease of the posterior roots, and it seems to render the theory of a peripheral neuritis possible.

The case, with necropsy, reported by Auerbach[1] is certainly the most important in the literature of erythromelalgia since the disease was first described. Auerbach reports briefly two cases which he considers like the case reported by Dehio. He says they were due to arterio-sclerosis and should be separated from the nervous affection known as erythromelalgia, whether the latter is central or peripheral, organic or functional. In the very condensed report of these two cases we find no mention of a microscopical examination and no statement concerning the condition of the nerves.

In a case in which the lower limbs were involved, reported very fully by him, a suspicion of tabes arose. The microscopical study was made by Edinger. The nerves of the lower limbs were perfectly normal, even in the feet, but we cannot be perfectly sure from the text that the most peripheral parts of these nerves were examined, although it is presumable that they were. The media and intima of the vessels were somewhat thickened, but not excessively so. The upper sacral and lower lumbar posterior roots were much degenerated, but the roots above these were intact. The nerve roots supplying the affected parts were the only ones diseased.

Auerbach acknowledges that the posterior roots are frequently degenerated without causing the symptoms of erythromelalgia, and he thinks that in his case vasomotor fibres were involved which, since the investigations of Goltz, are known to be present in the posterior roots. More recently, he says, the studies of Gaule have shown that a portion of the trophic vasomotor apparatus is contained in the spinal ganglia or the sympathetic fibres passing to them. Other cases of erythromelalgia in which tabetic symptoms were present have been reported clinically. Auerbach says that Edinger informed him that one of his (Edinger's) patients recovering from a severe multiple neuritis presented deep redness of both legs and feet after they had been hanging motionless a few seconds. This is a very important statement in connection with our findings.

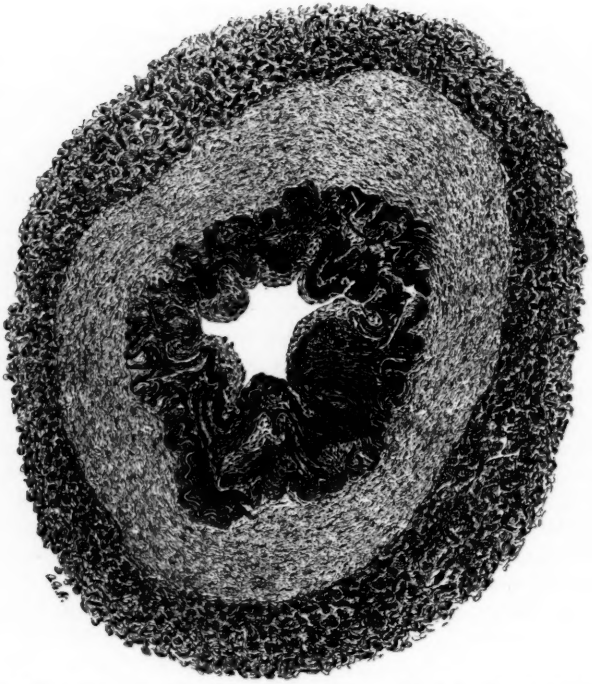
Auerbach justly says his case gives rise to the question: What must the nature of the disease of the roots be to produce erythromelalgia? This question he does not attempt to answer.

Thoma[2] examined the vessels in a case of supra-orbital neuralgia,

[1] Auerbach. Deutsche Zeitschrift für Nervenheilkunde, vol. xi. p. 142.
[2] Thoma. Deutsches Archiv für klinische Medicin, 1888, xliii. p. 409.

and found that the larger and smaller arterial branches from the supra-orbital region presented marked evidence of arterio-sclerosis, and that this sclerosis was much greater on the side where the neuralgia had existed. General arterio-sclerosis is usually attended by pain in different parts of the body. It is possible, therefore, according to Thoma, that the greater degree of the arterio-sclerosis in the supra-orbital region of the side on which the neuralgia had existed was the

FIG. 4.

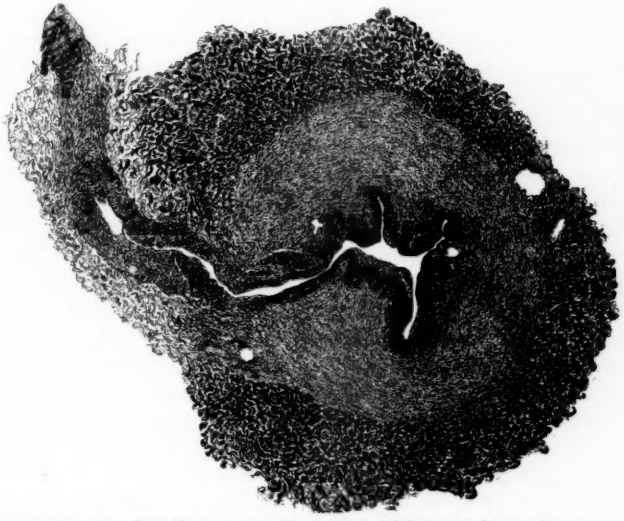


Section from an artery of the great toe. The intima is much thickened. The dark, wavy bands are probably reduplications of the elastic membrane.

cause of the neuralgia, but it is just as probable that the neuralgia was the cause of the greater degree of arterio-sclerosis in the affected region. The vasomotor disturbances which accompany neuralgia cause a periodic change in the lumen of the vessels and the rapidity of the current of blood, and in course of time lead to localized endarteritis.

Thoma was not able to observe any difference in the nerves and veins of the two supra-orbital regions. He mentions that attacks of supra-orbital neuralgia are accompanied by distinct hyperæmia of the painful region, and that this hyperæmia is due to the action of the vasomotor nerves. He has shown that when the lumen of an artery is too great for the amount of blood flowing through it, a compensatory connective-tissue thickening of the intima takes place, and the proper relations are restored. This may readily be seen in the stump after an amputation. The vessels, too large in the changed conditions, present contraction and concentric atrophy of the walls, or fibrous endarteritis, or both, and in this way the proper relations of artery and blood-

FIG. 5.



Section of an artery from the great toe. The media is thickened, and a new lumen seems to have been formed at the expense of the walls of the vessel.

current are restored. The less the contraction of the arterial wall, the greater the proliferation of the intima. This is a most ingenious explanation of the vascular alteration seen in cases of tic douloureux, and is applicable to the case of erythromelalgia reported in our paper. We are, therefore, unable to say whether the arterio-sclerosis or the neuritis of the toe was the primary lesion, as it is exceedingly probable that such disease of the vessels causes malnutrition and degeneration of nerve fibres. On the other hand, Thoma's investigations seem to

show that the neuritis may occur first, and cause the proliferation of the walls of the vessels. Bervoets found arterio-sclerosis in areas in which he had cut nerve fibres (cited by Dehio).

The case of interstitial hypertrophic and progressive neuritis of childhood published by Dejerine and Sottas[1] affords some similarity pathologically to this case of erythromelalgia. Through the kindness of these authors we have been able to examine sections from the peripheral nerves of their patient, and we find a nearly equal degeneration of nerve fibres in the two cases, and yet clinically the two diseases are very different. Dejerine and Sottas regarded the neuritis observed by them as ascending.

We shall not venture to express a positive opinion in regard to the primary seat of lesion in this case of erythromelalgia. Many investigations have shown that alteration of the cell-body occurs after peripheral lesion of the neuron, and Schaffer[2] recently has reversed this order. According to him, the changes in the peripheral portion of the motor neuron in tabes are secondary to a "partial degeneration," as he calls it, of the cell-body. The exaggerated knee-jerks in the present case would indicate that the roots of the mid-lumbar region of the cord were not degenerated.

The views held by one of us (Dr. Mitchell) for many years concerning the pathology of erythromelalgia seem to be justified by recent observations. So far as we are able to ascertain from the literature examined, the only distinctly pathological findings in this disease which could be considered in a causal relation are those of Auerbach and those which we now report. Dr. Mitchell[3] has always held that erythromelalgia may be due to some form of spinal disorder, and in his latest work (p. 180) stated that he still believed that this may be true of some of the cases. More recently, however, he has been inclined to attribute the symptoms of erythromelalgia to some form of neuritis, and has spoken of nerve-end neuritis. In two previous cases of Dr. Mitchell in which trunk nerves were examined, no changes were detected within them. These observations were made by Dr. D. Braden Kyle and Dr. Charles W. Burr, but in neither case could the peripheral nerve-ends be studied.

In one of the cases of erythromelalgia reported by Dr. Mitchell (*loc. cit.*, p. 192) exaggerated knee-jerks disappeared with the cessation of pain following excision and stretching of the nerves of the foot. This is an important fact, and seems to indicate that the exaggeration was

[1] Dejerine and Sottas. Mém. de la Soc. de Biologie, 1893. Dejerine. Revue de Médecine, November, 1896.

[2] Schaffer. Monatsschrift für Neurologie und Psychiatrie, 1898, vol. iii., No. 1.

[3] Mitchell. Clinical Lessons on Nervous Diseases.

due to pain, and warns us against placing too much value on exaggerated knee-jerks in these cases as a sign of spinal-cord disease. It is not improbable that the cells of the lumbar region controlling the knee-jerk are thrown into a state of hyperexcitability by inflammation of nerves having their reflex arc below the lumbar segment. It is uncommon to find exaggerated reflexes in neuritis, but it has been shown by one of us (Dr. Mitchell[1]) that certain forms of irritation of a nerve trunk may cause excessive irritability in the muscles supplied by the affected nerve, as was seen when a frozen nerve thawed.

We do not overlook the fact that the patient described in this paper was advanced in years, and that the arterio-sclerosis may have been largely or even entirely due to this fact. Arterio-sclerosis is not at all uncommon in the aged, and erythromelalgia is. We not infrequently find numbness and tingling in the fingers as a result of vascular disease, but we do not commonly find the grave signs of erythromelalgia. We believe, therefore, that we are justified in attributing the symptoms in this case to peripheral neuritis, but inasmuch as such neuritis was absent in Auerbach's case, we must conclude that involvement of the sensory fibres anywhere between the spinal cord—or possibly within the spinal cord—and the peripheral ramifications is capable, under certain circumstances, of causing erythromelalgia; hysteria, also, may present similar symptoms. It seems not improbable that the posterior roots and the peripheral terminations are the portions of the sensory nerves most liable to undergo degenerative changes. It is true that our microscopical examination has been limited to the tissues from one of the great toes, but we have not noted any symptoms indicating involvement of the posterior spinal roots. The sphincters were not involved, and sensation was preserved.

The preservation of sensation in the great toe, the nerves of which were so greatly degenerated, is a striking fact. Sensation seems to obey different laws from those on which motion is dependent. The few scattered undegenerated fibres must be regarded as the agents for the transmission of sensation, and it would appear that a few sensory fibres may be sufficient for this transmission. Inasmuch as the portions of the nerves examined were taken from the toe where little or no muscular tissue was present, it seems proper to regard these nerves as almost entirely sensory in character.

Our case is not the only one in which the preservation of sensation has seemed almost inexplicable after a histological examination has been made revealing intense degeneration. Brasch[2] reports such a case and explains the apparent contradiction by the supposition that even the most careful technique will not reveal all the nerve fibres.

[1] Mitchell. Injuries of Nerves and their Consequences, p. 60.
[2] Brasch. Fortschritte der Medicin, 1898, No. 14, p. 553.

A CASE OF ENDOTHELIOMA LYMPHANGIOMATODES OF THE CERVIX UTERI.[1]

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As is well known, carcinomatous growths of the cervix are comparatively common. On the other hand, endothelioma is sufficiently rare to warrant a careful record of each case observed.

It may not be out of place to refer here briefly to three cases of endothelioma of the cervix, which are the only instances that I have been able to find in the literature.

In 1892 Amann, the younger, in his work on *New-growths of the Cervical Portion of the Uterus* (p. 31), cites a case of tumor of the portio vaginalis which up to that time had not been described. The growth had originated in the deep layers of the cervical mucosa, and had come from the endothelium of the lymph-vessels in this region. Amann was convinced that he was dealing with a genuine endothelioma. Of a supposed second instance of this kind, reported by Pick,[2] in which, however, the main tumor had arisen from the corpus uteri, we shall have more to say in discussing the case reported by Braetz,[3] who claims that his is the second on record. The description of the growth as given by Braetz is almost identical with that to be found in Amann's work. "At the margins of the tumor, in the connective tissue, were numerous anastomosing strands made up of cells inclosing a central cavity. These were made up mainly of large epithelioid cells. The central lumen contained numerous leucocytes, but no red blood-cells. The cell strands were neither externally nor internally sharply bounded by normal endothelium. The flat epithelium on the outer side of the portio vaginalis and the epithelium of the mucous membrane of the cervix and of the glands showed no signs of proliferation."

The lumina between the cell strands in Braetz's case did not show so many leucocytes as in that of Amann. Amann proved conclusively by serial sections that the growth did not come from the epithelium of

[1] Read before the American Gynecological Society at Boston, May 26, 1898.

Since this article was prepared for the press there has appeared in the Johns Hopkins Hospital Bulletin for August, 1898, an account of a case operated on by Dr. Kelly for a tumor which had originated in the cervex uteri. Dr. Elizabeth Hurdon, who made the pathological report, comes to the conclusion that this tumor had developed from the endothelium of the lymph spaces. The new growth was characterized by the formation of tubules and cell strands which had followed the course of the bloodvessels. The cells of the growth showed a definite relation to the surrounding stroma cells, while the epithelial elements of the tissue were practically normal.

[2] Archiv für Gynäkologie, 1896, Band xlix., Heft 1.

[3] Ibid., 1896, Band lii., Heft 1.

the portio. Braetz, although in his case complete serial sections were not made, examined a great many sections and did not find in any of them any connection with the epithelium. Braetz acknowledges that his tumor had all the macroscopic appearances of carcinoma, but goes into detail to show that the growth could not possibly have been an ordinary kind of carcinoma. In a similar way he shows that the microscopical appearances would not warrant the view that he was dealing with a sarcoma.

The tumor described by Pick (according to Braetz) was really a growth from the body of the uterus, which showed in different portions of it very different structures. From his description it must be concluded that the principle portion of the mass is to be regarded as a myoma with carcinomatous degeneration. The lower half of the tumor showed in a connective tissue strands of cells, surrounding a definite lumen, which were made up of large epithelioid cells. These strands showed neither externally nor internally an endothelial covering. Although no leucocytes were demonstrated in the strands, yet from their form and from their relation to the bloodvessels they must be considered as corresponding to lymphatics. Amann was able to show that the proliferation began in the finest lymphatics which were not surrounded by the tumor tissue, and lays stress on this as showing that the proliferation of endothelium was primary. This could not be demonstrated in Pick's case. Here there was undoubtedly a proliferation of the endothelium of the lymphatics, but it is questionable whether such a proliferation deserves the name of endothelioma, since it is found in a diffuse form surrounded by layers of tumor of a different structure. The character of the tumor is determined by the proliferation and change in the muscle elements. In Pick's case, in places the endothelium of the lymphatics had also shared in the proliferation; but the tumor should not, simply on account of the presence of such areas, be regarded as an endothelioma. Such proliferation of endothelium has not infrequently been found in other tumors, without, however, materially altering the character of the tumor.

Braetz agrees with Amann that the portio vaginalis has a distinct tendency to take on an endothelial growth. This also has been recognized by Veit, who says that the primary carcinomatous growths of the lower uterine segment must be reckoned as belonging to a special form of carcinoma.

The clinical history of the case which I wish to report is briefly as follows:

Mrs. B., aged sixty-two years, housewife, mother of five children, the oldest now forty, the youngest twenty-four years of age. Has had no miscarriages. Menstruation began at seventeen, was regular, lasting from five to six days, but generally profuse and painful. The meno-

pause was reached at the age of fifty-three years, but three years later patient noticed that she would have a discharge of blood from the vagina at regular intervals. This afterward occurred irregularly and only occasionally. The family history has no bearing on the case.

Present Illness. In addition to suffering from occasional hemorrhages from the vagina, which have lately occurred only at long intervals, the patient has been complaining for the past three weeks of grinding pains in the lower part of the abdomen which at times become very severe. She is also troubled with a dull pain in the left leg and a great deal of backache. Her appetite is good; the bowels rather constipated; there is no trouble with micturition.

On entrance into the hospital the patient weighed 135 pounds, and looked fairly well nourished. The heart, lungs, and kidneys were found to be normal. In connection with the examination of the pelvis and abdomen the following note was recorded:

The vaginal outlet is much relaxed; the walls are prolapsing; the cervix, which is deeply lacerated on both sides, is densely infiltrated and flush with the vaginal walls. The uterus is inclined forward; it is enlarged and not freely movable. No disease of the tubes and ovaries can be made out.

Diagnosis. Malignant disease of the cervix uteri.

Operation. The cervix was thoroughly curetted and cauterized, and a large amount of friable tissue was removed. The operation took place May 29, 1897. The patient made an uninterrupted recovery, and up to the present date (May 20, 1898) no definite signs of recurrence have been noted.

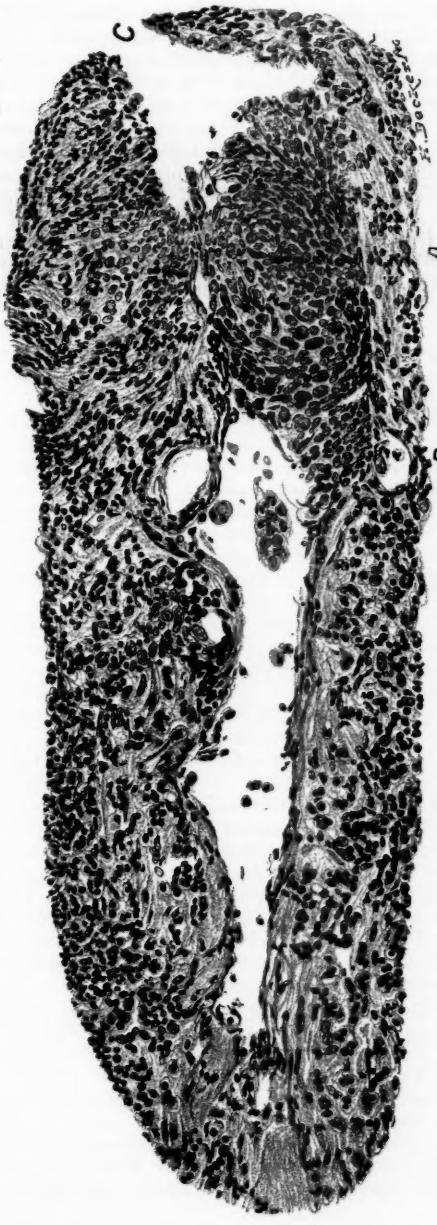
Examination of the Scrapings.[1] Macroscopically, the scrapings resemble those from a carcinoma.

Microscopical Examination. The specimen does not show mucosa; the muscular wall is seen to be invaded by a new-growth. The description will refer (1) to the muscular layer which composes the stroma of the tumor, and (2) to the tumor itself.

Muscular Layer. This appears as bands and nodes of tissue running in different directions between the parts of the tumor proper. The bands and nodes appear now in long and now in cross-section. The nuclei of the fibres are long, thin, and spindle-shaped, such as are seen in smooth muscle. In cross-section the character of the nuclei decides the nature of the cells at once. In many places this stroma of smosth fibres is infiltrated with cells of the young connective-tissue type, rouon and epithelioid cells predominating. The extent and degree of this infiltration are very variable in different parts of the section. Blood-vessels of large size, with well-formed walls, and smaller, cleft-likd openings, without distinct and independent walls, occur in the stroma. Only rarely are the red blood-corpuscles preserved in the sections. Especially noteworthy are the cleft-like spaces, which are very common and show lymphoid cells or desquamated endothelial cells and coagulated (albuminous?) contents.

Tumor. The larger portions of the sections are made up of the tumor proper. This consists of cells arranged in masses which occupy definite spaces. The cell masses are sometimes solid; sometimes they show a central space or lumen; or, again, they show a number of smaller vas-

[1] From the pathological laboratory of the Western Reserve University, Cleveland, Ohio.



Large lymph (?) space in muscular wall of uterus, showing the mass of tumor cells almost filling the lumen at *A*; at *B*, less definitely grouped cells and a mass of cells free in the lumen. There is a break in the tissue, accidentally produced, at *C*. The muscle is infiltrated with small cells.

cular clefts. The cells composing the masses are of two principal kinds: (*a*) the predominating cell, oval in shape, possesses a large nucleus, vesicular in form, which contains a nucleolus and one or more chromatin granules. Between these cells there is more or less intercellular substance of faintly granular aspect, which cannot be differentiated from the protoplasm of the cells. No fibres can be made out. Rarely several larger nuclei are massed closely together, giving rise to an appearance of multi-nucleation or giant-cell formation. These cells are in other respects of the same kind as those of the predominating variety. With these are mingled (*b*) cells of a smaller size and of lymphoid type; they are irregularly distributed, but occur in all parts of the tumor.

Some of these tumor cells are undergoing disintegration (fragmentation), and occasionally one of the larger cells shows karyorrhexis.

The relation of the tumor cells to the stroma is very important. Under the low power of the microscope it can be seen that the former do not lie within closed spaces—*e. g.*, alveoli—but that the cell masses ramify in the muscular stroma of the uterine wall. There is considerable complication in the mode of invasion; but in a simple section, and in one plane only, the tendency to run through the stroma is evident, and strands of cells can be followed over considerable areas. The cells do not completely fill the spaces, but leave a light line of demarcation. In other places, however, the separation is not sharply defined, but the outermost layer of cells have attached themselves closely to the stroma. The first few rows of cells next the stroma tend to be placed so that the nuclei are perpendicular to the surface. Beyond this no such regularity is observable.

The cleft-like spaces in the rows of cells are lined with flattened cells resembling those of endothelium. Many of these spaces are narrow and of a diameter which scarcely accommodates more than one lymphoid cell. They appear in cross and longitudinal sections, and possess no proper wall except this lining. Without, they are supported by tumor cells, which are sometimes flattened to the depth of two or three in juxtaposition to the lumen. The extent of these vascular clefts is very variable; many form simply round or oblong spaces (cross-sections?), while others extend a long distance, and wind in and out with the cell masses of which they form the central boundaries. Blood was not discovered in them; although coagulated (albuminous?) contents could be made out. These spaces seem at times to open into the intervals between the masses of cells and the smooth muscle forming the stroma.

Vessels of a somewhat different type appear within the cell masses. These possess a distinct fibrous adventitious coat of slight thickness, although no muscular tunic can be detected. The adventitial coat goes over into the spaces between the adjacent cells.

To return to the clefts among the stroma. These, as has been stated, are lined with cells of an endothelial type. In this respect they agree with certain of the spaces containing strands of tumor cells, while they also correspond in general form to the large spaces. There is therefore a strong suggestion that the strands of tumor cells occupy spaces which have the same origin and nature as the free spaces mentioned, and which, so far at least as the larger and most pronounced ones are concerned, are quite unmistakably lymphatics. If this supposition, then, be correct, the cell masses are contained within lymphatics. Further-

more, the cell masses do not in every instance completely fill the lymphatics; a central lumen is often preserved which agrees in its appearance, lining, and contents with the lymphatic spaces described. What, then, would appear to have taken place is a growth of cells, either originating from the walls of the spaces or invading the latter from outside? The persistence of the lumen favors the supposition that they come from the walls, and are not the result of an invasion from without.

Additional support for this view of the origin of the cells within the spaces is found in the proliferation actually observed to be going on in such a lymphatic in an uninvaded part of the specimen. From this endothelial-lined wall a growth is forming which at this stage is about as large as a miliary tubercle and which projects into and quite fills, so far as its width extends, the lumen of the vessel. On each side the endothelium is preserved, but goes over gradually into the nodule.

From this description it must be concluded that the tumor has sprung from the endothelium lining enlarged and perhaps new lymphatics in the uterine wall. It is therefore proper to designate it an *endothelioma lymphangiomatodes.*

In conclusion, I wish to express my thanks to Drs. S. Flexner, W. T. Howard, Jr., and Walter R. Lincoln for valuable assistance in the preparation of this paper.

TUBERCULOSIS OF THE AORTA.

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Since the classical researches of Weigert,[1] and his pupil Hanau,[2] on the sources of infection in acute miliary tuberculosis there has been abundant evidence that the walls of the veins may become the seat of tubercle, and the work of Koch[3] and others has shown that the smaller arteries are also quite frequently attacked by the tuberculous process. Instances in which the larger arteries, however, and particularly the aorta, have become implicated in the tuberculous process are so uncommon that two instances which have come under our own observation are here reported.

In reviewing the literature bearing on this subject I have been able to find but few reported instances of the condition, and it would seem worth while to give briefly the main points of each of these. The cases are not all of a similar character, as in three of them the involvement of the aorta was due to direct extension from a tuberculous process originating outside of the vessel; while in the others—and my cases are

[1] Weigert. Virchow's Archiv, Band lxxvii. and lxxxviii.
[2] Hanau. Virchow's Archiv, Band cviii.
[3] Koch. Mittheilungen aus dem Kaiserl. Gesundheitsamt, Band ii. S. 26.

included in this class—the tubercle was probably due to direct implantation of infective material on the vessel-wall.

The cases in which the aortic process was due to a direct extension are those reported by Dittrich,[1] Kamen,[2] and Sigg.[3] Dittrich's case occurred in a boy, aged twelve years, with generalized miliary tuberculosis following chronic glandular involvement; there was present on the posterior wall of the aorta, a short distance above its origin, a bean-sized adherent lymph-gland, corresponding with which there was present on the intima a small oval defect with somewhat elevated edges. Microscopical examination showed that the two processes were continuous, and that the lymph-gland and vessel-wall both showed the histological elements of tubercle, with the presence of many tubercle bacilli.

Kamen's case, which occurred in a cavalryman, aged twenty-four years, was also due to the adherence of a tuberculous gland to the aorta, with subsequent dilatation and rupture of the vessel at the point of adhesion. The process was shown to be tuberculous microscopically, and tubercle bacilli were present in the lymph-gland, though not made out in the wall of the aorta. Ordinary arterio-sclerotic changes were also present in the affected area. Sigg's case occurred in a male, aged sixty-four years, with old apical and intestinal tuberculosis, acute miliary tuberculosis, and arterio-sclerotic changes in the aorta and coronaries. In this case a portion of consolidated lung, containing a cavity filled with caseous material, was adherent to the aorta, which at this point showed bulging of its wall and a perforation of its coats which, externally, was limited by the caseous material filling the cavity, and internally by a thrombus. The microscopical examination showed the usual elements of tubercle, with giant cells and many bacilli, which were present even in the thrombus covering the internal opening in the aorta.

The second group of cases show quite different characteristics, the tuberculous lesions occurring in the form of nodules springing from the intima and projecting into the lumen of the aorta. Weigert[4] reports two cases, presumably of this character, but gives hardly any detail; one of them, he states, was shown to him by Marchand, while the other, which was observed in his laboratory by Huber, is stated to have shown exquisite tubercular structure, with caseous centre and giant cells. Flexner[5] reports the first case of this kind in which a satisfactory description of the lesion is given. It occurred in a male, aged twenty years, who died of general tuberculosis, probably resulting from a

[1] Dittrich. Prager Zeitschrift für Heilkunde, 1898, S. 97.
[2] Kamen. Ziegler's Beiträge, 1895, S. 416.
[3] Sigg. Beiträge zur Lehre der Acetun Miliartuberculose. Inaug. Discuss. Zürich, 1896.
[4] Weigert. Virchow's Archiv, Band lxxxviii. S. 360.
[5] Flexner. Johns Hopkins Hospital Bulletin, 1891, p. 120.

tuberculous process in a pulmonary vein. Two and one-half centimetres below the origin of the subclavian artery there was present on the aortic intima a mass which projected into the lumen of the vessel. It was two and one-half millimetres in length and one millimetre in height at its highest point. The mass had a nodular form, and was apparently made up of several single masses; it was pale and translucent. Microscopical examination showed the nodule to be seated directly on the intima and to consist of several masses separated by connective tissue and having caseous centres. Outside of the caseous material the masses were made up of epithelioid cells, a small amount of fibrous tissue, and many leucocytes. A few giant cells were present, and tubercle bacilli were also demonstrated in small numbers. There were no arterio-sclerotic changes in the aorta in this case. The case of Hanot and Lévy[1] occurred in a man, aged sixty-one years, who died of acute miliary tuberculosis. There was present in the upper part of the thoracic aorta a tubercular nodule; it was single, round in shape, grayish, of firm consistency, and the size of a pinhead. It projected slightly into the lumen of the vessel. The microscopic examination showed a caseous centre and about this tuberculous structure containing a few giant cells. Tubercle bacilli were present in the nodule, but only in small numbers, judging by the illustration which accompanies the article. The middle and external coats were free from evidences of tubercle, and no arterio-sclerotic changes were present. There was a small inflammatory area at one point in the adventitia.

Stroebe's[2] case is reported as one of tuberculous aortitis, but from his description it would not seem to differ materially from those already cited. The deeper parts of the intima seem, perhaps, to have been more involved than in Flexner's or Hanot and Lévy's cases. In this case there was present in the ascending aorta, two centimetres above the sinus of Valsalva, a small excrescence seven millimetres in height and three to four millimetres in thickness. It was irregular and nodulated and had a pedunculated character, the outer enlarged portion being covered by a partly organized and partly fresh clot. Histological examination showed the nodule to be made up peripherally of epithelioid cells and polynuclear leucocytes; centrally, of caseous material; the apex was capped by a partly organized clot. Numerous tubercle bacilli were present in the nodule and extended to its periphery in one place so as to be in actual contact with the blood-stream. The media and intima were unaffected except that in the neighborhood of the tuberculous process a portion of the media was necrotic, and there were collections of polynuclear leucocytes in the neighborhood of the

[1] Hanot and Lévy. Archives de Médecine Expérimentale, 1896, p. 784.
[2] Stroebe. Cent. für allg. Path. und Path. Anat., 1897, S. 998.

vasa vasorum. No arterio-sclerotic changes were present in the vessel wall. Stroebe, in his paper, includes among probable cases of the affection that of Zahn,[1] which was described as a case of aortitis verrucosa; Marchand also believes this to be a case of aortic tuberculosis. Zahn himself, however, who was present at the demonstration of Stroebe's specimens at the Brunswick Naturalists' Society, states flatly that the case was not one of tuberculosis, and hence we will not include any description of it.

Of my own two cases, the first was observed in the Pathological Laboratory of the Johns Hopkins University and Hospital, and I am indebted to Prof. W. H. Welch for permission to report it; for the second case I am indebted to Dr. George E. Gorham, of Albany, N. Y., in whose practice it occurred.

CASE I.—Colored man, aged forty-five years. The anatomical diagnosis was as follows: Chronic tuberculosis of the peritoneum; acute miliary tuberculosis of the lungs, liver, spleen, kidneys, intestine, adrenals, pancreas, trachea, bronchi, epididymis, testicle, bladder, brain membranes, bone-marrow, and aorta; cloudy swelling of the liver and kidneys; arterio-sclerosis; slight coronary artery disease; slight chronic interstitial myocarditis.

The following are the notes on the aorta:

Macroscopical. The aorta shows a patchy atheroma throughout in a moderately advanced fatty stage. In the descending aorta three nodules are to be seen, all of them apparently below the diaphragm; two of them appear as pinhead-sized, gray, translucent nodules projecting above the surface of the intima and sharply localized; the third one has a yellowish tinge, is slightly larger, and is apparently situated in the vessel-wall.

Microscopical. Each nodule appears as a small, rounded elevation seated on the intima of the aorta. The endothelium covering the intima can be traced as far as the projecting nodule, but does not extend over this. The intima does not show any thickening where the nodule occurs, but in other places in the section it is distinctly thickened and, in its deeper portions is at times devoid of nuclei, and evidently necrotic. The nodule affects only the most superficial layers of the intima; in fact, it has almost the appearance of being stuck on to its inner surface. The parallel arrangement of the intimal nuclei can be traced even in its most superficial parts under almost the entire area involved by the nodule; only at one end is there slight cellular infiltration affecting the superficial intimal structure. The media shows in places slight changes in the form of an infiltration of round cells between the muscle cells in the neighborhood of the vasa vasorum; these changes are most marked in the portions of the media lying beneath the thickened areas in the intima.

The nodule mentioned above is made up almost entirely of cells of the epithelioid type, with long or irregular-shaped nuclei. The central portion is almost free from nuclei and has the usual appearance of

[1] Zahn. Virchow's Archiv, Band lxxii.

caseous material. An occasional cell, with a round, darkly-staining nucleus is seen in the portion of the nodule next to the intima, but no such cells are to be made out in the portion next the blood-stream. No definite giant cells are seen, though in one or two places there are clumps of epithelioid nuclei suggesting their formation. No remains of blood-pigment are seen in the nodule. Sections stained with carbol-fuchsin and decolorized with acid alcohol showed a few tubercle bacilli. The lymph glands in the immediate neighborhood contain definite caseous tubercle nodules, with giant cells, but are nowhere adherent to the aorta.

CASE II.—White woman, aged fifty years. The anatomical diagnosis was as follows: Old caseous tuberculous focus at the apex of the right lung, with softening, miliary tuberculosis of both lungs and the peritoneal covering of the spleen; miliary tubercles of the spleen and liver; acute swelling of the spleen; caseous tuberculosis of the kidneys; fresh tuberculous ulcers in the stomach and ileum; tuberculosis of the descending aorta.

The following is the abstract from the protocol referring to the aorta:

Macroscopical. At one point in the descending aorta there is present a small, pinhead-sized excrescence. It is rather firm in consistency, gray and translucent in appearance and with a finely-lobulated surface, being apparently formed by the growing together of three or four small circular nodules. It springs from the intima by a moderately broad base, but is slightly constricted at a short distance from its origin, which gives it a polypoid appearance. The aorta shows a number of patches of fatty and calcareous atheroma.

Microscopical. The excrescence described in the naked-eye description is seen as an irregular elevation on the intima. The elevation springs from a broad base and varies in shape in different sections. In some it is rounded, but in others shows definite excrescences corresponding to those seen with the naked eye. It is made up of a cellular and a necrotic portion. The cellular portion is situated at the periphery of the nodule, and is made up almost exclusively of irregular cells of an epithelioid type. In places in this portion an occasional small round cell is seen, and in one section a typical giant cell is present. The entire periphery of the nodule is not equally cellular, for while there are many cells in the portions of the periphery abutting on the blood-stream, the portion lying against the intima shows only a very few epithelioid cells lying in the innermost portions of this coat; in fact, the intima seems scarcely at all invaded, and the nodule in this, as in the previously described case, has almost the appearance of having been stuck on to the intima. The central portion is almost free from nuclei, contains a few nuclear fragments, and has the usual appearances of caseous material. The epithelial layer of the intima apparently stops short at the nodule, and does not cover it. The intima is apparently not thickened beneath the nodule, nor does it show any thickening elsewhere in the specimen. The media and adventitia show no changes. Sections stained with carbol-fuchsin and methyl-blue show innumerable tubercle bacilli in the cellular portions of the nodule (a few in the caseous portion). They have no definite arrangement. Nothing resembling altered blood-pigment is to be seen in the nodule.

Aside from the extreme rarity of the lesion, the last group of cases are of interest with regard to the method of origin of the tubercles. It may be assumed that tubercles of the aorta can arise either by direct transplantation of infective material from the blood-current or from the entrance into the vasa vasorum of tubercle bacilli. The probability of the latter mode of origin is almost certainly negatived in all of the reported cases belonging to this class by the situation of the lesion; in all but one of the cited instances the media did not show any changes that could be regarded as tuberculous in nature, and in Stroebe's case there was only a slight amount of necrosis of the innermost portion of this coat. According to the observations of Plotnikow,[1] the vasa vasorum of the aorta extend only half-way into the media from its external surface, so that the possibility of infection in this way in these cases is very slight. An origin from infective material carried in the blood-stream seems much more probable in all these cases; in our two cases the most striking thing in the sections was the extremely slight involvement of even the most superficial layers of the intima, the tubercles looking almost as if they had been stuck on to this coat, so slightly was it affected; the illustration in Hanot and Lévy's case would lead one to suppose that here, also, only the superficial portions of the intima were affected, and the description in Flexner's case gives one the same impression. The method of infection here is probably similar to that which occurs in some forms of endocarditis and aortitis. The experiments of Ribbert,[2] of which Stroebe speaks, show that, in the case of the endocardium, infection of the valves can take place without any previous disease or traumatic influence, though in these experiments foreign bodies in the shape of fine particles of potato were introduced into the circulation with the bacilli. In the experiments of Boinet and Romary,[3] these authors were at times able to set up changes in the aorta resembling arterio-sclerosis by the mere injection of bacteria, without accompanying trauma or the presence of foreign particles. It is presumable that the pre-existence of some lesion of the intima would favor the development of the tubercles, though there was no apparent indication that such changes were present in any of the cases under discussion. The fact that the existence of a previous lesion may favor the development of tuberculosis is shown by the case of Cordua,[4] where an œsophageal carcinoma became infected with tuberculosis, and the case of Breus,[5] where both gastric and œsophageal cicatrices became similarly infected. The occurrence of arterio-sclerosis in connection with the tuberculous lesion in some of the cases is certainly suggestive in this connection; but in several of the cases the individuals

[1] Plotnikow, cited by Stroebe. [2] Ribbert. Fortschritte der Medicin, 1886, S. 1.
[3] Boinet and Romary. Archives de Médecine Expérimentale, 1897, p. 902.
[4] Cordua. Arbeiten a. d. patholog. Institut in Göttingen, 1893.
[5] Breus. Wiener med. Wochenschrift, 1878, No. 11.

affected were very young and showed absolutely no change in the vessel-walls, while in other cases, as in our own, though arterio-sclerosis was present in the vessel-wall in places, none was to be observed in the immediate neighborhood of the tubercle nodules. It is conceivable that in cases of this sort, in which large quantities of bacterial toxins are circulating in the blood-stream, these might be able to cause localized areas of lessened resistance in the vessel-wall and prepare it for the lodgement of the tubercle bacillus. That bacterial toxins, without the presence of the bacteria themselves and without accompanying traumatism, are well able to cause changes in the aorta is shown by the researches of Boinet and Romary,[1] who were able to produce definite lesions by the injection of the toxins of tetanus and of diphtheria. Direct infection from the lymph vessels is hardly to be thought of, the current being in the wrong direction to convey infection from the neighboring glands, and the vessels in all probability reaching only the same distance into the vessel-wall as do the bloodvessels—*i. e.*, to the middle of the media.

The possibility of these tubercle nodules being due to the invasion of small parietal thrombi by the tubercle bacillus must be thought of, as invasion of thrombi by tubercle bacilli has been observed in connection with heart lesions in some instances; but in none of the reported cases was there evidence to support this theory. In Stroebe's case there is distinct mention made of the fact that nothing like changed blood-pigment was present in the tubercle nodules, nor could we find any evidence of such in our cases. The presence of a small amount of fibrin in the tubercles, such as occurred in Stroebe's cases, is no evidence of thrombotic origin, for Falk[2] has shown that a fair percentage of tubercles contain fibrin at some stage in their development. The results of the experiments of Boinet and Romary on the production of aortic inflammatory lesions lead us to hope that in the future the origin of aortic tubercles may be made clearer by similar methods.

COMBINED TYPHOID AND MALARIAL INFECTION.

REPORT OF A CASE AND REVIEW OF THE LITERATURE, WITH SPECIAL REFERENCE TO THE SO-CALLED TYPHO-MALARIAL FEVER.

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For the past half-century there has been much controversy among medical men on the question of the coexistence of typhoid and malarial

[1] Boinet and Romary. Archives de Médecine Expérimentale, 1897, p. 902.
[2] Falk. Virchow's Archiv, Band cxxxix. S. 339.

infection in the same subject and the clinical picture resulting. The various theories that have been advanced on this subject are too many and diverse to enumerate. So long as the exact cause and nature of both diseases were unknown it is natural that little headway could have been made in solving the problem. To-day, however, with the cause and nature of each of these diseases established and resting on scientific demonstration, we should expect that the question of the coexistence of the two diseases would have been solved beyond controversy. This, however, is not the case, and almost as much uncertainty exists as formerly. Few of the cases clinically diagnosticated as combined typhoid and malarial infection, *typho-malarial* fever, etc., have been studied by modern laboratory methods of scientific research. It is clear, however, that until such exact methods of study shall be generally employed the subject of discussion will remain open.

It is my purpose in the present article to collect from the literature and present, in abstract, such cases of combined typhoid and malarial infection as have been studied by the best methods of modern investigation, and to draw from these cases evidence on the nature and general clinical picture of such combined infections. I shall pay special attention in this brief survey to the subject of the so-called *typho-malarial* fever. For the purpose of this study I have accepted such cases only as meet the following requirements:

1. That typhoid fever and malarial fever coexist in the same individual.

2. That this coexistence be shown (*a*) by the discovery of the parasites of malarial disease in the blood, and (*b*) by strong evidence, clinical, pathological, bacteriological, etc., of true typhoid fever.

I have been able to collect from the literature twenty-nine cases meeting these criteria, to which I shall add one case that has been under my care recently in the Johns Hopkins Hospital, in Dr. Osler's service. In all, then, I shall present brief notes of thirty cases of true combined typhoid and malarial infection. I shall refer, also, to other cases, presumably combined typhoid and malarial disease, described in the literature, but not meeting the above requirements.

The case that I have had under my observation and charge in the Johns Hopkins Hospital is as follows:

H. B., male, aged forty-eight years, a carpenter, entered Johns Hopkins Hospital, Baltimore, January 5, 1898, complaining of "chills and fever." Hospital No. 21,646.

While working at Hawkins Point, on Chesapeake Bay, a few miles from Baltimore, he had three successive attacks of "chills and fever," occurring respectively in June, August, and October, 1897. The chills were typical, severe, and shaking, lasting from one to two hours, and required him to stop work for about two weeks during each of the periods mentioned. He took quinine irregularly during each attack,

not between the attacks. He lost thirty-five pounds in weight between his first attack of malarial fever, in June, and the beginning of his present illness, in December, and during this whole period felt weak and ill.

The first symptoms of his present illness date from December 18th, and from this date until his admission, on January 5th, he had daily chills, slight and confined to his back. Headache accompanied the chills, and sometimes backache and nausea. Vomiting occurred once, on December 19th. There were no sweats, cough, nor epistaxis. The bowels were regular. Quinine was taken regularly three times daily. He took to bed January 2, 1898.

On admission, January 5th, his condition was as follows: Temperature, respiration, and pulse normal; tongue dry and coated; lungs negative except for a few crackles at the left base; a soft systolic bruit at the heart's apex; liver and spleen both enlarged and felt just below the costal margin, and tender on palpation; abdomen full and rather tense, but not tender; no gurgling in iliac fossæ; a few rose-spots on the abdomen; bowels constipated; Ehrlich's diazo-reaction in the urine; no malarial organisms in the blood; Widal's serum reaction not present.

During the forty-eight hours following admission two suspicious febrile paroxysms occurred without chills or sweating, but accompanied by headache. Repeated examinations of the blood for malarial parasites were negative. After the first forty-eight hours the temperature assumed a typical typhoid course, which was maintained throughout until convalescence. Quinine was not given, except as hereafter stated. The course of the typhoid fever was characteristic and of average severity. The bowels were constipated throughout. Numerous rose-spots appeared over the trunk, arms, and legs. The Widal serum reaction developed, and was positive. The leucocyte count was characteristic, falling to 4000. Blood cultures taken on several occasions proved negative, as also cultures from the feces, so far as the differentiation of the bacillus typhosus is concerned. The temperature reached normal on the thirty-first day of the disease (dating from the time the patient took to bed), and the patient entered upon convalescence.

After nine days of normal temperature a febrile paroxysm developed, without chill or sweating. A second similar paroxysm occurred two days later, and a third paroxysm two days after this. The blood was examined during the third paroxysm, and showed numerous full-grown pigmented tertian malarial organisms and a few young hyaline forms in the red blood-corpuscles. Extracellular pigmented forms and pigmented leucocytes in active amœboid movement were observed later in the day. On the following day a few full-grown organisms were observed, and a day later stray pigment granules in the serum. Quinine was given in large doses at the time of the first discovery of malarial organisms, and was continued until the patient's discharge. After the third paroxysm no further evidence of malarial fever was seen, and the patient was discharged, well, February 24th.

To summarize briefly: this case had successive attacks of malarial fever in June, August, and October of last year, imperfectly treated with quinine. Between these attacks, and following them, the patient lost weight, had little appetite, and was weak. The malarial infection

was probably present throughout and dormant in the intervals. The repeated daily chills that occurred from December 18th to January 5th were probably, but not surely, malarial. It is possible that they were merely the initial chills[33] sometimes seen in typhoid. The febrile paroxysms seen on the patient's admission may possibly have been malarial in origin, though the negative results of repeated blood examinations make this very doubtful. At any rate, the malarial organisms showed no further influence on the course of the typhoid fever until convalescence had been well established. The course of the typhoid was typical and of at least average severity. Malarial paroxysms occurred during convalescence and yielded promptly to the action of quinine, and the patient quickly recovered. It is to be noted also that for eighteen days prior to admission the patient had taken quinine three times daily.

The cases furnished by the literature,* twenty-nine in number, are as follows:

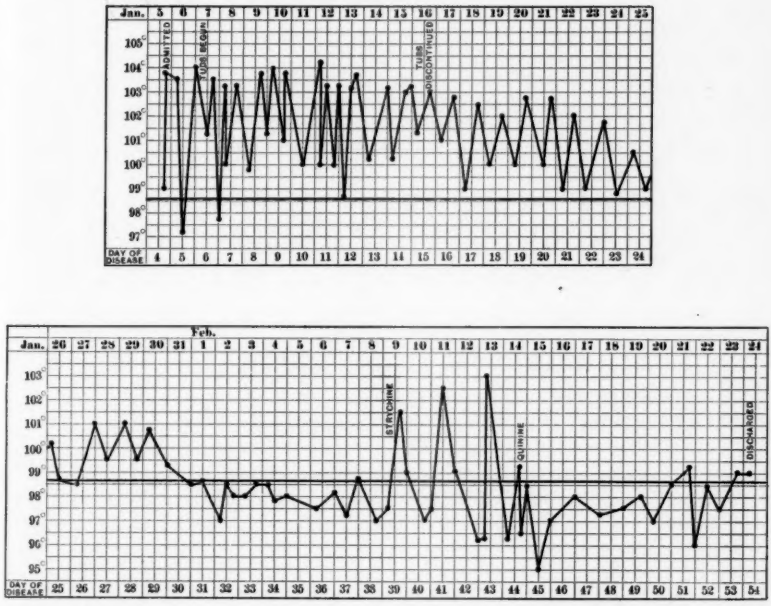
	Cases.	Mortality.	Per cent. mortality.
Osler	1	0	0.0
Da Costa	1	0	0.0
Kinyoun	5	2	40.0
Thompson	3	0	0.0
Laveran	2	0	0.0
Vincent	17	8	47.0
	29	10	34.4

Osler's [28 29] case. The patient was admitted to the Johns Hopkins Hospital October 16, 1891. (Hospital No. 4051.) During the sixteen days prior to admission the patient had had headache and cough, occasional epistaxis, and three chills. On admission the temperature was 100° F., falling to 96° F. at midnight. "The blood on the 17th showed fairly numerous, non-pigmented, intracellular, hyaline bodies." Quinine was begun. At 12 M. on the 17th the temperature began to rise, and at 3.30 P.M. the patient had a chill, after which the temperature rose to 104.2° F., falling to normal at 12 M. on the 18th. During the next several days there were slight oscillations in the temperature, which remained nearly normal. "The last malarial organism seen in the blood was an ovoid body, with coarse pigment granules, which was seen on the 23d." The temperature began to rise on the 22d, reaching 104.8° F. at 4 P.M. on the 23d, the beginning of a long, severe attack of typhoid fever. Quinine was discontinued on the 26th. The course of the typhoid fever was typical, but of great severity, the temperature not falling to normal until between the fifth and sixth weeks. Rose-spots developed during the course. The patient had in all sixty-eight baths. No further evidence of malaria appeared, and

* Anders'[35] cases are omitted from this enumeration, because no record in detail of the cases has been published. In a letter to the writer, however, Dr. Anders states that "tertian malarial organisms were noted in five" of the eight cases, and that "in two out of the five cases in which malarial micro-organisms were found, distinctive and conclusive evidences of typhoid fever were furnished by my notes, such as enlarged spleen, characteristic eruption, the characteristic temperature-curve, peculiar nervous symptoms, etc."

the patient was discharged, well, on January 19th. (The temperature-chart is produced in full.)

TEMPERATURE-CHART.



Admitted January 5th, on fourth day of disease. Tubs begun on January 7th, and discontinued January 16th. Strychnia sulph., gr. $^1/_{60}$, twice daily, begun February 9th and continued until discharge. Quinine sulph., gr. v t. i. d., begun February 14th and continued until discharge, on February 24th.

Da Costa's[38] case. Patient entered hospital November 9th. About three weeks before, patient began to have headache, backache, and paroxysms of chill, high fever, and sweating, occurring on alternate days. These paroxysms continued to occur for two weeks. The week before admission diarrhœa began and the fever became persistent, accompanied by slight cough, loss of flesh, and weakness.

After admission the patient had no chills, but had a "continued fever, which exhibited the features of typhoid." The temperature-curve for the first few days showed marked irregularity. On admission the temperature was 97° F., rising to 102° F. during the day, declining to 100° F. on the next morning, and again rising by evening to 103.8° F. On the day following the morning temperature was 100.6° F. and the evening temperature 103.2° F. After this the temperature showed less irregularity. The clinical picture was characteristic of typhoid, and a large number of rose-spots appeared. Convalescence became established, and recovery followed. The blood examination (at what

time made, not stated) showed "marked brown pigmentation, and with these masses there were various forms of malarial organisms, though not the crescentic forms. The white corpuscles contained a great deal of pigment, irregular in shape; there was none in the red cells. On the whole, the evidence of malaria in the blood is striking and unquestioned."

(In a personal communication to the writer Dr. Da Costa states that the above description of the parasites is inaccurate, and that pigmented hyaline organisms were found in the red blood-corpuscles.) The temperature-chart of the case is published. Quinine was administered.

Kinyoun's[21] cases. Kinyoun studied the cases of malarial fever and typhoid fever at the New York Marine Hospital for the presence of malarial organisms in the blood and the bacillus of Eberth in the spleen and intestinal canal. More than one hundred cases of malaria were studied. The writer does not state the number of cases of typhoid fever seen. All of these cases were in sailors coming from the Southern States and from Virginia in particular. Among these he observed five instances of mixed typhoid and malarial infection. He divided his cases clinically into two groups, as follows:

Group I., including "cases in which the symptoms of malarial fever predominate, masking the enteric lesion," two cases.

Group II., including "cases in which the symptoms of enteric fever are most prominent," three cases.

In all cases the malarial organisms were found in the blood and Eberth's bacillus in the spleen or intestinal canal. The types of malarial organisms observed are not mentioned, and temperature-charts are not reproduced.

Case I.—Two days before admission patient had a chill, followed by fever marked by a remission; on day of admission chilly sensations, with a rise in temperature, followed by remission. The blood examination showed a large number of the "plasmodia malariæ, found both in the serum and within the blood-corpuscles" The epigastric region showed tenderness and the spleen was considerably enlarged. "On the fifth day after admission there appeared on his abdomen several suspicious-looking spots suggestive of enteric complications. On the day following he had slight epistaxis and a tendency to diarrhœa, tenderness in the right iliac fossa." At this time "a bacillus answering to the description of that described by Eberth was isolated from the stools," and the blood examination still showed "'the malarial parasites, in greatly diminished numbers, confined to the corpuscles." During the next week the entire symptoms became marked, the remissions in the fever ceased, and the temperature-curve was characteristic of typhoid fever.

Case II.—The symptoms were not so pronounced as in the first case, but, on the whole, the case did not differ from the first. "The plasmodium malariæ was found in the blood in abundance, and later the typhoid bacillus was isolated from the stools."

Group II., three cases. "The enteric symptoms were well marked, giving a clear history of the disease. The history gave the prodromal

period, lassitude, etc., followed by diarrhœa, epistaxis, and tympanites, and in one case slight hemorrhage." The "malarial parasite" was found "confined to the corpuscle, not free in the blood serum." The typhoid bacillus was isolated in every case. In one case during the third week in convalescence, with normal temperature, a rise of temperature to 39° C. occurred, lasting four hours. Twenty-four hours later a similar rise of temperature occurred. The blood was examined and the "plasmodium" was found. Antiperiodic treatment was employed for a few days, and the case went on to speedy convalescence.

The two other cases of this group terminated fatally, one by peritonitis following perforation, and the other by pneumonia.*

Thompson's[26] cases. CASE I.—Patient denied having had ague; developed typhoid fever, which began typically, without any suggestion of malarial complication. Numerous rose-spots developed in successive crops. The disease pursued a prolonged course, with very severe and grave symptoms. On the thirteenth day a severe chill occurred, accompanied by a temperature of 106.6° F., without sweating. The blood examination showed malarial organisms "in exceptionally large numbers, invading the red blood-corpuscles and also independent of them." Quinine was administered. During the third week two similar paroxysms occurred, and quinine was again employed. No further manifestations of malaria appeared, and the case terminated with recovery. The temperature-chart is given.

CASE II.—Two weeks before admission patient had had five or six severe chills, accompanied by nausea, vomiting, slight diarrhœa, fever, and severe frontal headache. On admission unmistakable signs of typhoid fever were present, including many rose-spots on the chest, abdomen, and back. The urine showed the diazo-reaction. The disease ran a typical course of average severity. In all, thirty tubs were given. Defervescence became established on the thirty-first day. After seven days of normal temperature three quotidian paroxysms of chill, high fever, and profuse sweating occurred. Malarial organisms in abundance in the blood were found. Quinine was given. The patient showed no further evidence of malaria, and in a few days was discharged, cured. The temperature-chart is given.

CASE III.—Patient admitted on nineteenth day of illness, with all the signs of well-established typhoid fever. There was a distinct eruption of rose-spots on the abdomen and thorax. The course of the fever was of average severity, and the patient received in all twenty-one baths. Defervescence was established on the thirty-third day. After eight days of normal temperature two quotidian paroxysms of chill, high fever, and sweating occurred, and quinine was administered. The blood was not examined until twenty grains of quinine had been taken, and then showed no true malarial organisms, but "abundant malarial pigment granules were contained in the blood-cells." Recovery immediately followed. The temperature-chart is given.

(This case is included in our enumeration of cases on the evidence of

* A full report, presumably of this case, is published in the "Annual Report of the Supervising Surgeon-General of the Marine Hospital Service of the United States," Washington, 1890, p. 187.

the presence of malarial pigment contained in the blood-cells following the febrile paroxysms, despite the fact that living organisms were not found.*)

Laveran's[18 43] cases. CASE I.—Patient entered the hospital at Constantine, Algeria, August 2, 1882. Diagnosis on admission, typhoid fever. In March, 1881, patient had had a fever lasting three days, with herpes labialis. The fever disappeared without the use of quinine.

July 31, 1882. First symptoms of present illness; general malaise, general weakness, headache, burning thirst, and fever with chill. Fever persisted without marked remission until patient entered hospital, and continued also after admission, without remission. Typical symptoms of typhoid fever developed, but rose-spots never appeared.

August 11*th*. Fever began to subside.

20*th*. Defervescence complete and convalescence begun. The temperature had been typical of typhoid.

29*th*. Patient complained of chill, and said that for several days he had had a chill in the evening; evening temperature 39.5° C.

30*th*. At 8 A.M. the blood examination showed various forms of malarial parasites in large numbers; temperature about normal; quinine was begun; evening temperature 38.5° C.

31*st*. Apyrexia; parasites in the blood in reduced numbers; quinine continued.

September 5*th*. There has been no further evidence of malaria; patient discharged, well.

(The temperature-chart is not given.)

CASE II.—Patient entered the hospital at Constantine, Algeria, January 25, 1883, complaining of intermittent fever. Patient had been in the hospital at Philippeville in August, 1882, for twenty-three days, with intermittent fever; no return of fever until January 20, 1883.

January 20*th* to 24*th*. Quotidian paroxysms of fever with initial chill regularly at 2 A.M.

24*th*. Morning temperature, 40.2° C.; evening temperature, 38.9° C.; anæmia well marked, earthy hue of face, mucous membranes pale, general thinness and feebleness, anorexia, tongue fair; blood examination showed malarial parasites and pigmented leucocytes; quinine begun.

25*th*. Morning temperature, 38.2° C.; evening temperature, 38.4° C.; anorexia.

25*th*. Apyrexia.

27*th*. Apyrexia; no organisms in the blood.

February 4*th*. Quinine discontinued.

8*th*. Patient complains of not sleeping, and general malaise and headache for the past few days; no chills; morning temperature, 39.5° C.; evening temperature, 40.6° C.; blood examination negative; quinine begun.

9*th*. Morning temperature, 39.7° C.; evening temperature, 39.9° C.; general symptoms of typhoid fever.

10*th*. Morning temperature, 39.6° C.; evening temperature, 40.1 C.; typhoid state pronounced.

* In a letter to the writer dated February 22, 1898, Dr. Thompson states that he has notes of several other cases of double typhoid and malarial infection that have recently occurred in New York, and that he has heard of the occurrence in New York of several cases more.

11*th.* Morning temperature, 39.3° C.; evening temperature, 40.3° C.; rose-spots on abdomen; quinine discontinued.
15*th.* Defervescence begun.
18*th.* Blood examination negative.
20*th.* Defervescence complete—*i. e.*, on the seventeenth day of the typhoid fever; apyrexia persisted until
March 8*th.* Chill; temperature, 40.3° C.; blood examination showed malarial parasites.
9*th.* Apyrexia; quinine begun.
14*th.* Apyrexia has persisted; no further evidence of malaria; quinine discontinued.
15*th.* Patient discharged, cured.
(Temperature-chart not given.)

(Laveran describes several other cases[18 43] that were undoubtedly combined malaria and typhoid, as shown at autopsy, but they cannot be accepted in this enumeration, as they either occurred before the discovery of the malarial parasite or there is no note of the presence of the parasite in the blood.)

Vincent's[33] cases. Vincent, a French army surgeon, at the bacteriological laboratory of the Hospital du Dey, in Algeria, encountered seventeen cases of combined typhoid and malarial infection, which he called "fièvre typho-palustre." Sixteen of these cases were in soldiers from Madagascar and one in a soldier who contracted the disease in Algeria.

The clinical symptoms of the disease varied considerably between those of typhoid and those of malaria, but in a majority of the cases the symptoms of typhoid dominated the picture.

The first manifestations of the infection consisted in an initial rise of temperature, almost always rapid, sometimes abrupt, resembling malaria, with or without a chill, severe headache, general body pains, and sometimes epistaxis. Once established, the fever persisted, often irregular and capricious in its course, or higher in the morning than in the evening. Sometimes the initial fever was only transitory, and was followed by an almost normal temperature during the course of the disease, interrupted by an occasional high rise. The latter type was observed twice.

The pulse-rate followed the oscillations of temperature, remaining high in the intervals. It not rarely varied between 130 and 150, or more, to the minute. It was dicrotic, compressible, sometimes very small, and was accompanied by cardiac irregularities, etc.

Profound stupor, delirium, excitement alternating with depression, earthy hue of face, dusky, dry lips, teeth, and tongue, intense albuminuria were seen in all the cases, indicating the gravity of the infection. Death, following severe symptoms, occurred in some cases in the first week.

Thoracic complications (bronchitis and lobular pneumonia) were almost constant. Rose-spots were present in twelve of the seventeen

cases. The right iliac fossa was tender on pressure. Constipation sometimes occurred, generally, however, diarrhœa, yellow and of fetid odor. In one case death followed choleriform symptoms. Two cardinal symptoms were always present: the earthy hue of the face and the enlargement of the spleen. Tenderness over the liver was also present. Death was often due to complications, such as myocarditis, parenchymatous nephritis, gangrene of the lung, lobar pneumonia, abscess of the kidney and the spleen, peritonitis, etc.

The convalescence was slow, establishing itself at the end of the third or fourth week, and often, during this period, isolated febrile paroxysms occurred. All cases were given large doses of quinine.

Pathological. In all cases the blood was examined during life and to the end of the infection, and malarial parasites (amœbæ, segmenting forms, and crescents) were found, except in one case in which, at autopsy, the parasites were found abundantly in the spleen.

Eight of the seventeen cases terminated fatally. In all the fatal cases, at autopsy, tumefaction and ulceration of Peyer's patches in varying degrees were noted. These lesions were often very small. The mesenteric glands were hypertrophied. The spleen was always enlarged, in one case weighing nine hundred grammes, and the surface had the color of graphite. The liver was hypertrophied, soft, and brown in color. The kidneys showed the characteristic lesions of parenchymatous nephritis. Microscopic examination of the liver and spleen showed melanosis. Sections of the spleen showed a number, sometimes considerable, of the organisms of malaria, especially the crescents. Cultures from the spleen were carefully studied and showed a bacillus presenting the morphological and biological characteristics of the *bacillus typhosus* of Eberth.

Vincent concluded, "from the anatomico-pathological changes which are found in the fièvre typho-palustre, and especially from the result of bacteriological and microscopical examinations of the blood and viscera, we believe that we may conclude that the syndrome studied is no other than a mixed infection due to the association of the bacillus typhosus and the pathogenic agent of paludism."

A separate narration of cases is not given, but four temperature-charts are given, showing as follows:

1. Abrupt rise of temperature from 36.1° C. on the first day to 40° C. on the second, falling to 39.1° on the third day, with death on the fourth day.

2. Temperature-curve most irregular, with three tertian paroxysms during the course, followed by death.

3. Temperature-tracing in general close to normal, with acute paroxysms occurring on the second, third, twelfth, and thirty-second days of the disease, with death on the thirty-ninth day.

4. Quotidian paroxysms of temperature on the fifth, sixth, seventh, eighth, and ninth days, with death on the tenth day.

Having now passed in review these thirty cases of combined typhoid and malarial infection, we shall attempt to derive from them what information they afford on the subject of the so-called *typho-malarial* fever.

The existence of mixed forms of intermittent and typhoid fever has been noted at various times by many writers. In 1781 Burserius[1] described them under the group-name "the proportionata." Hermann Schmidt[2] in 1830 described them, and divided them into two groups, viz., (1) "typhus intermittens subintrans," in which the typhoid element predominated, and (2) "febris intermittens typhosa," in which the intermittent fever was predominant. In Italy, Maillot[3] described them in 1836, and Felix Jacquot[4] in 1851. In the United States, Drake[5] observed the double infections before 1854, and designated them "remitto-typhous." Dickson[6] referred to them in 1855, and Levick[9] in 1863 gave them the name "miasmatic-typhoid fever." Many other references[11 13 15] to these mixed infections are found in the literature of different countries.

The term *typho-malarial* fever was introduced in the United States in 1862 by Woodward,[7 8 10 17] a surgeon in the army, who encountered in his service in the field during the war cases of fever which presented a clinical picture typical neither of typhoid fever nor of malarial fever, but apparently a compound of both. This fever he called *typho-malarial*, and on his suggestion this term was introduced by the Board of Medical Officers[17] in the blank forms of the monthly sick-reports of the army. As a result of the introduction of the new term in the army there were reported to the office of the Surgeon-General[14] during the war 57,400 cases of this disease, with 5360 deaths.

The new disease-name was quickly adopted and became general in the United States, and found its way into local health-board reports and eventually into many of the standard text-books of medicine, such as Flint, Loomis, Clymer, etc. It met with strong opposition,[12 16] however, in many quarters. Among French writers the disease was called by various terms, such as "fièvre typho-malarienne," "fièvre typho-malariale," "fièvre typho-palustre," "fièvre typho-paludéenne," "fièvre proportionnée typhoïdique," etc.

In 1876, at the meeting of the International Medical Congress in Philadelphia, Woodward[17] read a paper on the nature of "typho-malarial" fever, and, at this time, took the ground that it was a *hybrid* disease produced by the concurrent action of malarial and typhoid infection, and, on his motion, the following definition was adopted as expressing the opinion of the Section on Medicine: "Typho-malarial fever is not a specific or distinct type of disease, but the term may be

conveniently applied to the compound forms of fever which result from the combined influence of the causes of the malarious fevers and of typhoid fever." This definition of "typho-malarial" fever is the one most generally accepted to-day by the advocates of the existence and prevalence of such a disease. But it is not to be understood that all physicians using this term have any such exact idea of its nature as is indicated by the above definition. The term "typho-malarial" fever, as Woodward pathetically remarked, has been used extensively by many physicians to denote any obscure febrile affection which offered diagnostic difficulty. The term is very widely employed in the Southern States, and is very common in the North as well.

Accepting, then, this definition of "typho-malarial" fever, what is the clinical picture of the disease? Its advocates[25] in America, as a rule, state that it is a prolonged fever, exhibiting typhoid characteristics, and ushered in and often accompanied during its course by repeated paroxysms of chill, high fever, and sweating. The onset of the disease is more abrupt than that of simple typhoid fever, and its termination is often by crisis. Bilious symptoms are frequent. Jaundice, or an icteroid hue of the skin, is more common. Abdominal tenderness, distention, etc., are usually present, though often slight. Diarrhœa may or may not be present. Rose-spots seldom develop. The course* of the fever is shorter and markedly milder than that of typhoid fever. The prognosis is consequently highly favorable and the mortality very low. Severe symptoms, such as hemorrhage, perforation, etc., sometimes, though rarely, occur, as in simple typhoid fever. As to the value of quinine, much diversity of opinion is found. All agree that it does not influence the course of the typhoid element, and many state that its influence in controlling the malarial manifestations is slight or entirely wanting. Others state that it is of distinct value in combating the malarial element.

The above clinical description of "typho-malarial" fever appears to be that given by a majority of its historians in America, though every conceivable addition to or subtraction from this symptomatology is found in the literature.

It must be noted, however, that the French descriptions of the disease differ in important respects from the American. Most of the French writers state that the course of the disease is usually severe and the mortality high;[15 18 19 20 24 33 43] that complications are common;[20 24 33]

* Several American writers of note state that the course of the disease is not less severe than that of simple typhoid fever, but the vast majority of American physicians, especially in the South, who describe "typho-malarial" fever, hold the view that the disease is much milder and less dangerous than typhoid fever. The following example is fairly illustrative: At a summer hotel an epidemic of typhoid fever occurred due to contaminated well water, and a large number of people were simultaneously taken with the disease. In one family three cases occurred, of which one, with a severe attack, was diagnosticated as typhoid fever, and the other two, with mild attacks, as "typho-malarial" fever.

that rose-spots usually appear,[18 19 20 24 33 43] and that quinine has a modifying influence on the disease.[18 19 20 33 43] The French writers also hold various views as to the resulting clinical picture, some stating that the two diseases are simply superimposed the one upon the other, each preserving its individuality,[19 43] and others finding that the clinical picture varies markedly in individual cases,[44] in some showing a predominance of the typhoid, in others a predominance of the malarial manifestations, and in others a combination of both of these elements, and in some of these last cases an apparent clinical fusion of the two elements.[20 24 33] The view is also held by some that the malarial manifestations remain latent during the course of the typhoid.[43] As a rule, the Italian observers[23 30 36] state that the two diseases are coincident and superimposed, each preserving its individuality.

It is thus seen that the usual American descriptions of "typho-malarial fever" differ essentially from the French, and we shall now consider which view, if either, is sustained by the evidence of our thirty cases of true combined typhoid and malarial infection.

A glance at these cases shows that, as a rule, the course of the disease was of at least average severity as compared with typhoid fever and generally of greatly increased severity. Only one or two cases exhibited a mild course. The mortality was high. Ten of the thirty cases ended fatally, a mortality of 33.3 per cent. This high rate of mortality is nearly double that of typhoid fever, if we take a large body of typhoid statistics covering a long period of years and collected from different climates and regions of the world. Complications, often severe, are seen to have occurred in a large number of the cases. Rose-spots are specifically mentioned in twenty of the cases, and in several of the other cases they may have occurred, although the notes are silent on this point. Quinine was given on the appearance of malarial manifestations in nearly all, if not, in fact, in all of the cases, and is seen to have had an unfailing influence, either controlling the malarial element for a period or removing it entirely from the scene. Quinine thus shows itself to be a true remedial agent, and appears to be as efficacious in controlling the malarial element in the combined infection as it is in uncomplicated cases of malarial fever. It is also of diagnostic value,[41 43] second only in importance to the microscopical examination of the blood.

As to the clinical picture presented in our cases, no uniformity is found. The typhoid picture, however, was always present, and in nearly all of the cases dominated the scene. The malarial manifestations appeared at different points in the different cases. Repeated paroxysms of chill, fever, and sweating at the onset of the disease appeared in many of the cases, in this respect resembling the picture generally described in "typho-malarial" fever. In other cases these features

were absent. In some of the cases febrile paroxysms occurred during the height of the disease and irregularly through its course, though this was the exception. In other cases the malarial paroxysms occurred only in the convalescence from the typhoid. It is interesting to note also that in several cases malarial paroxysms directly preceded or accompanied the onset of the typhoid, disappeared completely from view during its course and again reappeared during convalescence. This would seem to indicate, as Baccelli,[30] Laveran,[43] and others[36] have suggested, that the typhoid fever is the more masterful disease, and to illustrate the truth of the old adage, "de duobus morbis corpus unum obsidentibus potior alterum obscurat;" but the important fact must not be forgotten in this connection that quinine was freely used against the malarial element whenever it appeared, and in all probability completely changed the clinical picture that would otherwise have been seen, and I am firmly convinced that had the malarial involvement been left untreated to pursue its own course the composite clinical picture would have been very different from what it actually was after quinine had removed the malarial participation in the course of the disease. There appears to be every reason for believing that without the interference of quinine the malarial paroxysms of chill, fever, and sweating would have continued to complicate the picture of the typhoid and would have caused an appearance of a thorough mixture and fusion of the malarial and typhoidal elements of the disease, as has been claimed by many American writers. The malarial element in our cases seems to have been suppressed from view by the quinine, but in many cases reappeared at one point or another whenever, in the struggle for existence, its power became strong enough to assert itself visibly.

Before dismissing the subject of paroxysms of chill, fever, and sweating, described as occurring so commonly at the onset of "typho-malarial" fever, it is well to remember that similar paroxysms are sometimes seen at the onset of simple typhoid, and even at times during its course, as Osler[32] has well shown. Profuse and repeated sweating is sometimes, though rarely, seen in typhoid fever of so pronounced a character as to have given rise to the term "sudoral typhoid" of Italian and French writers. Jaundice is another rare complication of typhoid fever, being seen in only 1.1 per cent. of the Munich[22] autopsies.

A few other clinical features of our cases remain to be pointed out. Abdominal symptoms in most of the cases were marked, not slight, as the American writers describe in "typho-malarial" fever. Bilious symptoms in these cases were not more prominent than would be expected in such a series.

If we add to our thirty cases of true combined typhoid and malarial infection many other cases described in the literature[18 19 20 24] that do not meet the criteria we have established for admitting them to our

enumeration, but, nevertheless, resting upon sufficiently detailed clinical observations to establish as very probable their authenticity, we shall find in them strong confirmation of almost all of the facts observed in our thirty cases, although, of course, individual differences occasionally occur. Most of these cases are recorded in the French literature, though some few described by American writers are also found.

What, then, is the result of our study bearing on the question of the prevalence of a "typho-malarial" fever? It is seen that our cases of true combined typhoid and malarial infection offer little or no support for the "typho-malarial" fever as described clinically by American physicians, but, on the contrary, support strongly the observations of the French writers who have described a "typho-malarial" fever. It is seen that the "typho-malarial" fever of the French observers is a true combined typhoid and malarial infection; but the "typho-malarial" fever described as so prevalent in the United States, and especially in the Southern States, is not, as a rule, certainly a true combination of typhoid and malarial disease. The important point of difference clinically between the "typho-malarial" fever of American and French writers is found in the *severity and mortality* of the disease. The statistics of the United States army[14] during the war show the mortality from "typho-malarial" fever to have been less than one-third of the mortality due to simple typhoid fever. Such figures, of course, show that the "typho-malarial" fever reported during the war was not true combined typhoid and malarial fever, but doubtless it was either very mild simple typhoid (generally) or continued malarial fever.

Unfortunately, very few observers of the "typho-malarial" fever of our Southern States have studied their cases with modern methods of scientific investigation. However a few scientific observations on the subject have been recorded.[27 28 29 37 40 41] Dock,[27] of Galveston, Texas, stated, in 1894, that in his wide experience he had never encountered a case of combined typhoid and malarial fever, nor had he ever seen the Southern type of "typho-malarial" fever. He had "offered to go anywhere where a doctor had a case of continued malarial fever or typho-malarial fever," in order to discover the malarial parasite in the blood of a typhoid case, but he had never found such a coincidence. He conducted six autopsies on cases diagnosticated by experienced men as "typho-malarial," and in all cases found simple typhoid fever. At the Johns Hopkins Hospital in Baltimore, where hundreds of cases of typhoid fever and of malarial fever are seen, many coming from the neighboring Chesapeake Bay region and from the Southern States, the "typho-malarial" fever of Southern writers is unknown, and only two cases of true combined typhoid and malarial infection have been seen. The reports from foreign countries in general are the same. The Italian observers,[29 30] so fortunately placed to study this subject, are

not acquainted with the American type of "typho-malarial" fever. Rho[36] states that not a single such case has been reported from Italy. It therefore seems clear that the disease described as so prevalent in our Southern States is not a true combination of typhoid and malarial fever. It seems probable that future investigations will show it to be most often a mild form of simple typhoid fever,[27 31 37] and in some cases irregular continued malarial fever.

That continued malarial fever often shows a picture so close to that of typhoid fever that a diagnosis is very difficult is well known, and such cases are not infrequently seen in the Johns Hopkins Hospital, and have been described by all writers on malarial fever.[30 39 41 42 43] Exact observations must be made in the Southern States, and the microscopical and clinical laboratory methods of study must be employed more generally before the exact truth about the "typho-malarial" fever can be known.

It is especially to be desired that systematic observations on this subject may be made by our army surgeons situated at various places in the Southern States.

In regard to the relative frequency of occurrence of true combined typhoid and malarial infection, what are we to infer from our study? Do we agree with the conclusions of Rho,[36] writing in Italy, who says: "The term typho-malarial fever has caused much uncertainty in medicine and much error of diagnosis; so far as relates to the contemporaneous infection of malaria and typhoid, the matter reduces itself to a rare coincidence, to a simple complication, which does not merit a special name."

I think that our statistics show evidence that, on the whole, this conclusion is rather too sweeping, but would apply with a considerable degree of accuracy to temperate climates where malarial fever is not common. In southern and tropical countries, where malarial fever is endemic and typhoid fever prevalent, it seems entirely probable that cases of combined infection are fairly common. This view is supported by Vincent's seventeen cases from Madagascar and Algeria, Laveran's two cases from Algeria, Kinyoun's five cases, coming from our Southern States, and by many other observations made in southern countries, and especially by French physicians in the countries lying in the Mediterranean basin. The mere mathematical theory of chance would also support this view.

It is probable that cases of true combined malarial and typhoid infection are not uncommon in our Southern States, but such cases are certainly not the cases that have been described from the South under the name "typho-malarial" fever. It is to be sincerely regretted that this misnomer has become so general, involving as it does an error of diagnosis and sometimes useless and even vicious therapeutic measures.

There is no excuse for preserving the term, and we may hope that the near future will find it thoroughly eliminated from use.

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THE OCULAR EVIDENCES OF HYSTERIA.

WITH ILLUSTRATIVE CASES.

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NOTWITHSTANDING the importance attached by writers to the eye-symptoms in the diagnosis of hysteria, and although Charcot himself years ago pointed out their extreme value in establishing the identity of this neurosis, they have not received the attention they deserve. Of all the sense-organs, not excepting the skin, the visual apparatus furnishes the most constant, the most easily detected, and the most conclusive signs of the hysterical presence. This is my apology for importing into this essay a description of the simpler methods employed in making an examination of the eye for evidences of the disease. Although well known to every ophthalmologist, they are often unfamiliar to the general student, and will consequently bear description.

My purpose is to dwell only upon the ocular signs of hysteria that are most commonly found in cases of *petite* and *grande hystérie*, as well as to furnish a description of the means by which they may be accurately determined, even by those who make no pretence to a knowledge of ophthalmology, who are not expert in the use of the ophthalmoscope, and who are not familiar with even the rudiments of physiological optics.

In the cases presented the diagnosis of hysteria was made from the eye-symptoms and ocular signs; in most instances confirmatory evidence was subsequently obtained by a more general examination of the patient.

Probably the most important hysterical eye-signs are anomalies of accommodation—affections of the ciliary muscle.[1] Parinaud insists that

[1] The reader is reminded that the nearest point at which the eye can distinctly see the outlines of small objects held directly in front of it is called the punctum proximum (or P), the greatest distance being the punctum remotum (R). The distance between these is the range of accommodation, not to be confounded with the force exercised by the ciliary muscle in looking from P to R—the amplitude of accommodation. Without going further into this

even in the absence of other hysterical stigmata, the neurosis can be confidently diagnosticated when ciliary spasm (of the kind to be described) is present. In hysterical spasm the eye acts as if it were under the influence of pilocarpine or eserine. The accommodative range is limited at both ends, and the patient reads or does other near work with difficulty; for these reasons, the condition has been called hysterical insufficiency of accommodation, ciliary hyperæsthesia, ciliary paresis or paralysis, and painful accommodation. Every degree of spasm may be present, just as one sees all degrees of hysterical muscle-contracture elsewhere in the body. The *punctum proximum* and *punctum remotum* may approach or even coincide, and the patient reads fine print nearer the eye than usual or at a fixed point. This, when it occurs, may be regarded as conclusive evidence of hysteria. As a rule, however, there is a marked, but incomplete, spasm of accommodation—the near point for distinct vision being always nearer the eye than normal.

Hysterical spasm of the ciliary muscle usually produces false myopia and hysterical near-sightedness for distance, which, just like the axial variety, is improved by concave glasses. If there be a doubt as to the character of this short-sightedness, a single drop of a solution of atropia (1 per cent. in patients under thirty-five years of age, ½ per cent. for those between thirty-five and forty-five) instilled into each eye, after meals, for two days, will disclose the true refraction.

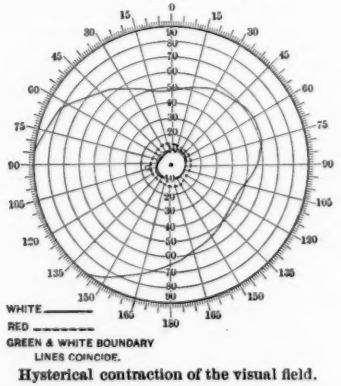
Case I. *Hysterical contracture of accommodation, with recurrent amblyopia and defective visual fields*.—B. E., aged ten years, well nourished, but a nervous, an ambitious and much-worked school girl, came to me on account of very defective vision. Three years previously she had had scarlet fever and, two years before, diphtheria. The latter was a mild attack, but the scarlet fever kept her in the house for over a month, and she was very ill. She had no renal or cardiac complication. In addition to the defective vision she complained of confusion of print for six months before I saw her. For that period, also, she experienced difficulty in distinguishing characters on the blackboard. She has constant frontal headaches and photophobia. She holds her book close to her face in reading, and contracts her brows in her efforts to see. V., R. and L. $= \frac{1}{5}$ —; Jaeger II. is read with difficulty at 12 cm. in each eye. At 15 cm. she can distinguish words of Jaeger IV. Under atropine for a week her vision improved to 20/XL —, and in two weeks she was able to read Jaeger II. fluently at 15 cm. and her symptoms greatly improved. Treatment: abstinence from all near work, outdoor life, strychnine, galvanism, and atropinization. Under this treatment her eyes, as well as her general health, grew gradually better, although she had many relapses. Six months later her vision

matter, a fair test of the accommodative range may be made (by the aid of correcting glasses if these are needed) by observing (1) how near the eye and (2) how far away the patient can read the finest (diamond) print. In fairly normal eyes (or eyes fitted with appropriate distant-glasses) the near point (P) tested in this way should be 7 cm. at ten years of age, 8 cm. at fifteen, 10 cm. at twenty, 11.7 cm. at twenty-five, 14 cm. at thirty, 18 cm. at thirty-five, 22 cm. at forty, 28.6 cm. at forty-five, and 40.5 cm. at fifty.

was 6/VI in either eye, and she could read Jaeger II. at 30 cm. and had a range of 20 cm. One month previously her vision in either eye was 6/VI, Jaeger II. at 18 cm., and a range of 5 cm. It is now nearly three years since I first began to treat her, and she has had a couple of relapses, always attended by lowering of central vision and marked ciliary contracture. Her fundi, examined frequently, have always been normal. Concave lenses assist the central visual acuity somewhat, but convex glasses have not enabled her to read any better. This patient has shown evidences of hysteria other than the ocular signs. She has had facial hemispasm and anæsthetic areas. The perimeter has shown a great variation in the size of her visual fields. The area for white always approached the normal size as the asthenopic symptoms disappeared, and, although at one time it was contracted to within 15° of the fixation point, it is now practically normal. The color-field did not vary as much as that for white, but there was always a certain correspondence between them. She was never entirely color-blind.

During one relapse, brought on by an injudicious effort to study, her field in the left eye contracted, as shown in Fig. 1. She then had

FIG. 1.



Hysterical contraction of the visual field.

a range of accommodation of 5 cm. (17–12 cm.), and the asthenopia was very marked. The pupillary reactions (light, accommodation, electrical and palpebral) were all very sluggish. There was a doubtful anæsthesia of the left cornea at this time. It is noticeable that the field for red is larger than that for white. In this case the reversal or unusual order of the white and color-fields was very marked, as shown in numerous perimeter charts.

Hysterical amblyopia may be so marked that the patient has to be led about the room, or, more usually, it may pass unnoticed by the patient. It is not improper to regard the visual defect as due to an anæsthesia of the perceptive elements of the retina in correspondence with that loss or perversion of sensation exhibited by the skin and mucous membrane in other phases of hysteria. This visual defect is

almost always present, and when the central acuity of sight, first determined by test-types, is nearly or quite equal, it will be found on careful inquiry that peripheral vision is uniformly affected. The normal limits of the field of vision are measured by a good, stationary perimeter, obtainable from any optician.[1]

CASE II. *Hysterical amblyopia and amaurosis and paralysis of accommodation in a boy; recovery; hysterical contraction of the fields of vision.* —J. Y., aged nine years, has a healthy parentage. He has been a "mouth-breather," owing to post-nasal adenoid vegetations and enlarged tonsils, ever since the mother can remember. He was sent to a kindergarten when six years of age, when it was noticed that his vision and color-sense were good. At seven he had scarlet fever.

He has been going to the public school for a year and a half, and during the past six months his teacher noticed that he did not see the figures on the blackboard very well and that he held his book close to his face while reading. Quite recently his vision has been very much worse—so much so that he runs against articles of furniture, and has been obliged to leave school. The patient is a bright, well-nourished, intelligent, and precocious boy, who tells a pretty consistent story of his troubles. He has suffered much from nocturnal enuresis during the past year and shows his nervous temperament by never remaining quiet for a minute at a time. Even when his vision became very defective he was constantly moving, wandering about continually from one part of the house to another.

November 17, 1895, the condition of his eyes was as follows: both pupils widely dilated, neither of them contracting more than ¼ their diameter on looking at a near point. They also responded very sluggishly, even to bright light. He perceived hand movements only in each eye, but at 10 cm., after some coaxing, could distinguish words of Jaeger XIV. This attempt, he claimed, brought on frontal headache, which he now has every day. He had marked photophobia. There were absolutely no fundus changes, and the retinal field was uncontracted to a very faint light. He was immediately treated with galvanism, interrupted current, half *ma.*, for five minutes at a time three times a week, and given a tonic containing strychnine. Atropine was prescribed, and, by the aid of skiascopy and the ophthalmoscope, his total refraction was found to be + 1 D. in each eye. After three weeks his adenoids and tonsils were removed.

January 17, 1896. Patient is decidedly better in all respects. V., L. = words of Jaeger I. and 20/xx, but the fine print can be read best at 20 cm., becoming more indistinct when the test-words are brought nearer or removed further from the eye. He was allowed to go to school for a few hours daily.

[1] The examination of hysteropes requires particular care, lest the patient's eye become fatigued and the defect be exaggerated or improperly measured. The perceptive elements of the retina in an hysterical subject are not very sensitive to form and white objects, and his ciliary muscle is usually weak. There should be frequent interruptions, therefore, of the work of perimetric measurement, and only one eye examined at a sitting. It should be remembered, also, that the hysterope is often greatly influenced by suggestion, and it is always wise to make "control" experiments when a subjective test is being used.

28*th*. Had to leave school owing to return of confusion of print, photophobia, and frontal pains. V., L. = $\frac{4}{5}$ and words of Jaeger X.; V., R = $\frac{4}{5}$ and words of Jaeger VI. The Jaeger types are read best at 12 and 15 cm., respectively; there is practically no accommodative range.

The patient was now put under atropine for two weeks, but, although there were fewer headaches, he experienced no other improvement. On recovery from the cycloplegia, V. = $\frac{1}{10}$ and words of Jaeger XVI. in either eye. No improvement with glasses for distance or near.

March 17*th*. Patient almost as bad as ever; V. = $\frac{1}{15}$ *u. o.* and no Jaeger. He was given galvanism regularly, and in the following June his visual acuity was $\frac{2}{3}$ in each eye, and he was able to read Jaeger II., with difficulty, at from 15 to 18 cm.

With slight relapses, this improvement held until the following October, when he was brought to me with V., R. = $\frac{2}{100}$ and words of Jaeger XII. at 15 cm.; V., L. = $\frac{1}{10}$ and Jaeger XII. at 16 to 18 cm. He now complained of photophobia, pain in eyes and forehead, and showed, for the first time, evidences of blepharospasm. He had a return of nearly all the signs of ciliary contracture that were present when I first saw him. I again thoroughly atropinized both eyes, and in six days had the satisfaction of discovering that he could read Jaeger I. at 25 cm. with + 4 D., and with + 1 D. got nearly normal vision in the distance. The atropine was continued for ten days and the boy sent to a manual training school, where it was arranged that he should use his eyes as little as possible for near-work. He has since had very few relapses. When twitching of the lids, photophobia, dimness of vision, or any of his old symptoms recur, he is kept from school and atropine employed. This appears not only to relieve the ciliary spasm, but has an excellent moral effect upon the patient, who is very fond of his work. When last seen he had some difficulty in seeing the blackboard, and I found his vision to be as follows: V., R. = $\frac{1}{2}$ and Jaeger I. at 12 to 15 cm.; V., L. = $\frac{2}{3}$ and Jaeger I. at 10 to 13 cm.

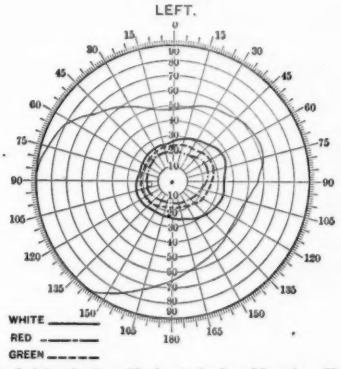
I never was able to demonstrate diplopia or polyopia in this case, although the patient presented many other local and general stigmata of hysteria.

The fields of vision in this case were very interesting. As soon as the patient could see a test-object 10 mm. square he was examined carefully with the perimeter many times. His field for white has never widened beyond 40°, even when his central acuity was normal. The narrowing of the field has always been regular. (See Figs. 2 and 3.) There have not been any sector-like defects or scotomata, relative or positive. In the early stages of the examination, and upon two other occasions, the boundary of the field for white coincided with the tenth parallel, and the color areas were almost abolished, but the average measurements have been about as follows: white, 30° all round; red, from 20° to 25°; green, from 25° to 30°. These measurements have varied greatly, owing to the ease with which the eyes were fatigued. Indeed, the fields for green and red have, on several occasions, measured

about the same as that for white. There has never been the slightest fundus alteration.

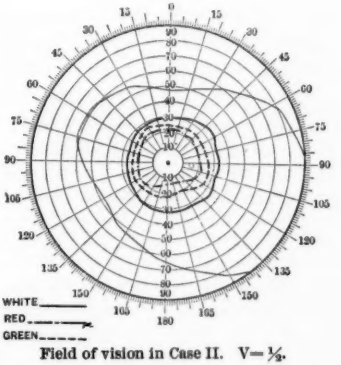
Contraction of the Fields of Vision. The predominant peculiarity of an hysterical contraction of the visual field is that while, in every other disease where peripheral limitations occur, the color-field is

FIG. 2.



Field of vision in Case II., hysterical amblyopia. V = 2/3.

FIG. 3.



Field of vision in Case II. V= 1/3.

affected *pari passu*, or in greater proportion than the field of white, in hysterical amblyopia the field is less affected for colors than is the field for white, just the reverse of that which obtains in other nervous affections. Even where the field for white is still the largest it can usually be shown (where there is no perimetric defect) that the visual field for

red is larger than that for blue, and these measurements should always be taken in doubtful cases. Excellent examples of this strange phenomenon are exhibited by most of the cases here reported. This reversal of the order and extent of the fields for white and colors is, when present, positive evidence of the existence of hysteria; it cannot be simulated, and is caused by no other ocular disorder. It is readily determined, and possesses a diagnostic value equal to the anæsthesia of the glottis and pharynx so frequently referred to as pathognomonic of this neurosis.

Blepharospasm. Although contracture and spasm of almost every member of the oculo-muscular system has been observed in hysteria, many of these are differentiated from true paresis and insufficiencies with some difficulty. A few are, however, so evidently functional disorders, and their detection is so comparatively easy, that I do not hesitate to refer to them as hysterical stigmata with which every one should be acquainted.

Even before the days of modern ophthalmology it was noticed that spasm of the orbicular muscles was frequently associated with amaurosis and amblyopia, even when there was no apparent structural disease of the ocular apparatus. Such a state of affairs should make us suspect and further examine the patient for hysteria. All such forms of spasm of the orbicularis—tonic, clonic, transitory or permanent, unilateral or bilateral—are probably hysteric. If central or peripheral excitants competent to produce the spasm can be excluded, and if other hysterical stigmata be present, the probability becomes a certainty. The orbicular contraction may be a part of a facial or more extended hemispasm, or it may be limited to a single muscle.

Case III. *Intermittent and chronic spasm of the right orbicularis and other facial muscles in an hysterical subject.*—Mrs. J. E. is the daughter of a distinctly neurotic mother, but did not herself exhibit signs of hysteria until a year ago, after a double ovariotomy. Following recovery from the operation she became easily excited, nervous, and had fits of crying. She also complained of transitory numbness of her arm and corresponding leg, accompanied by a feeling of general exhaustion. Complains much of headache affecting the vertex and occipital regions. Her range of accommodation is reduced one-third, and she complains of photophobia and asthenopia. Two weeks ago the lids of the right eye began to twitch, and this symptom has increased in severity since then. Some days it entirely disappears, to return on the slightest excitement or on attempting to read or sew. Her central vision is unaffected.

I kept this patient under observation for several months, and was unable to relieve the spasm, which finally extended to the whole group of facial muscles on the right side, including the masseter and sternomastoid. On several occasions there was some slight twitching of the facial muscles on the left side, but this did not persist. When I last saw

her the purely ocular distress had considerably diminished, but the muscular spasm was as marked as ever, in spite of general and local treatment.

Blepharospasm and photophobia are frequently associated in hysterical subjects, and both signs may be very marked. The following case is an example:

CASE IV.—At the instance of Dr. John A. McDonnell, I examined Mrs. B., aged thirty-one years, who had been in ill health and a pronounced neurasthenic for many years. Three months before my visit she began to complain of inability to use her eyes for more than a few minutes at a time. Later, she complained of photophobia and twitching of the lids. These symptoms increased in intensity until even the least exposure to light brought on "spasm of the lids."

When I saw her she was confined to bed in a room from which every ray of light had been excluded. Window curtains were drawn, shutters closed, and blankets had been pinned over the casements. Her eyes were completely covered with bandages, and over these she held her hands. After some persuasion she allowed a candle to be brought into the room, and by its aid I was able to make out, after removing the bandage, a well-marked bilateral tonic blepharospasm, unaccompanied by redness or tenderness of the globe. Further examination of the eye was impossible, but the patient presented other stigmata of hysteria.

Although the persistent blinking of the eyes that constitutes the usual form of clonic blepharospasm is not necessarily hysterical, it often forms one detail of the neurotic picture. Apart from organic disease of the lids or other parts of the eye, it may properly be regarded as a symptom of hysteria, and will usually prove to be such.

Monocular Diplopia or *Polyopia.* This is a curious hysterical phenomenon—probably the result of ciliary spasm—that may be developed in many hysteropes. I say developed, because the patient is usually unconscious of the double vision as such. It commonly presents itself to him as part of his visual defect. Tests should be made in both a lighted and a darkened room. One eye being covered, a white match is held vertically three or four inches in front of the uncovered eye. The patient is then asked to observe whether the object appears double, as it is slowly moved from its first position to a point three feet away. In most cases the match will present a double image when held quite near the face; the images approach one another and become quite or almost fused as they are removed, to separate again more and more until the metre distance is reached. The match is again from this point gradually brought close to the eye, when the same phenomena, but in reverse order, will be manifested. The second eye is similarly examined, and finally the room is darkened and a further (control) test is made with a candle flame. Sometimes three or more images (polyopia) are observed, and it is usually possible to exclude one or

more of these by carefully interposing a card so as to cover various segments of the pupillary area during the examination.

CASE V. *Hysterical, monocular, homonymous diplopia in a neurasthenic woman.*—Mrs. P., aged forty years, has had weak eyes as long as she can remember, and for ten years past has observed double vision when fixing either distant or near objects. This diplopia is lately quite marked when she attempts to read. Her general health is far from good, and she complains of "nervousness." There is no history of injury to the head, of constitutional disease, or of any organic brain lesion. She has never been very strong, and gives a history of several attacks of "nervous prostration." Steady use of the eyes brings on frontal headache and pains in the globes themselves. No glasses have relieved these symptoms, nor have they sensibly diminished the blurring and confusion of print observed whenever she attempts to read. In looking at a distant object the indistinct or second image appears to the right of the clearer one when looking with the right eye and to the left when fixing with the left eye. When her general health is at its best she can sometimes obtain a single, but blurred, image of a near object for a short time by making special efforts to fix.

The ordinary tests readily develop the monocular diplopia. In reading the distant test-types each letter is double, the diplopia being more marked with the right eye than with the left. V. = $\frac{2}{3}$ — in either eye. She has a regular hyperopic astigmatism of 1.0 D., and with this corrected the visual acuity is almost 1. On slowly approaching the nasal side of the right (the left excluded) pupil with a card, the second left image is gradually cut off and the patient sees singly. Reversing the experiment, the right image disappears. In the same way both the distinct and indistinct image in the left eye can be eliminated.

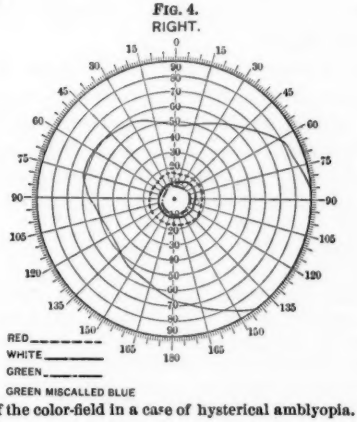
I saw this patient a year after my first examination and found the ocular conditions unchanged. She read Jaeger I. (blurred) with either eye. Her fields (roughly taken, owing to unwillingness of patient) for white and red were both contracted, the former much more, proportionately, than the latter. Her health had somewhat improved, but the diplopia had persisted, even under atropine and convex glasses, for both distance and near. The fundi were perfectly normal, and there was no defect of the extrinsic muscles, although the accommodative range was diminished nearly one-fourth.

CASE VI. *Contracture of the ciliary muscle, with monocular polyopia and amblyopia in a young hysterope; temporary cure by suggestion.*—D. N., aged thirteen years, is a nervous, imaginative child and intellectually far advanced beyond her years. Her father is also very "nervous" and has smoked to excess since boyhood. One sister is very delicate, and acts, the mother reports, as if she were going to have St. Vitus' dance. Ever since the child can remember she has had asthenopic symptoms. These were associated with indistinct distant vision and the necessity for holding her book close to her face—a condition unrelieved by any glass which she has ever had. If she reads for more than fifteen minutes the print blurs, her eyes ache, and she has severe supra-orbital pains. Her forehead has wrinkles which show distinctly when she fixes either a near or distant object. She has had double vision for years past. The pupillary reaction is fairly prompt to light, but is slow, imperfect, and irregular when the patient converges. Her

central acuity of vision varies from day to day. On the first occasion it was about $\frac{2}{3}$ in each eye, but it has fallen as low as $\frac{1}{8}$. She is always able to read at least words of Jaeger IV., but the amplitude of accommodation is extremely limited. She has no changes in the background whatever, and the media are quite clear. Her refractive error, under atropine, is insignificant, and there is no heterotropia worth speaking about. The double vision, upon a closer examination, resolved itself into monocular polyopia. This curious symptom could not be associated with any other cause than that of hysteria. I have made a number of experiments on the child with particular reference to this phenomenon, and am satisfied of its purely hysterical character.

The patient has contractures of the flexors of the forearm and fingers of the left hand. These are clonic in character, and have persisted for three years. She is very subject to vertigo and to headaches brought on by any attempt to use the eyes. In the course of a pretended examination of her eyes for glasses, vision can often be improved (by using a plane glass, a + or — 0.12 D. lens, or a $\frac{1}{2}°$ prism) from $\frac{2}{3}$ to $\frac{2}{2}$ or therabouts. The same is true of the shifting boundaries of her field of vision; it is extremely difficult to map out the areas for red, green, and white, although the latter usually occupies a larger space than the colors. A curious circumstance is that she refers the tones of five different tuning-forks to certain colors (that flash constantly before her closed eyes) while they are vibrating upon her vertex. C produces a brownish color, C^1 black, C^2 yellow, C^3 red, and C^4 yellow or yellow-white, and she is quite consistent in her replies to questions concerning them.

FIG. 4.



Reversal of the color-field in a case of hysterical amblyopia. V = $\frac{2}{7}$.

The patient has, thus far, not permanently improved, although there are days at a time when she seems very much better. Owing to the fact that her eyes are so readily fatigued, it is not easy to determine the limit of her contracted field for white, red, and green. Fig. 4 represents the second attempt of the series, there being very little difference between the two eyes. Red is largest, then comes white, and finally green, which is recognized as blue.

A temporary improvement was obtained in this child by ordering for her "suggestive" glasses. These were weak concave ($\frac{1}{8}$ D.) lenses that could not possibly exert any refractive influence upon sight, but were given her with the positive assurance that they would cure her. For a time the result was magical; she read Jaeger I. with ease and distant vision became nearly normal in either eye. The asthenopic symptoms lessened and the visual fields widened. When the glasses were removed from her eyes she became as blind as ever; when they were replaced the improvement was almost instantaneous. A relapse occurred after a few months and has persisted to the time of writing.

There are numerous other indications afforded by the ocular apparatus of the presence of hysteria.

As a rule, whether the pupils are unusually contracted or dilated, the ordinary reflexes are preserved—that is, they contract when light is thrown upon them, and when the patient is directed to fix a near object—they expand when light is withdrawn, or when he is told to gaze into the far distance.

Hysterical photophobia, not necessarily associated with spasm of the lid muscles, is a common experience in hysteria, and, when present at all, may be so marked as to give rise to a suspicion of organic disease. The absence of all signs of vascular congestion is usually sufficient to exclude the latter. The patient often asserts that the light hurts the eyes even when these organs are covered with a heavy bandage—an exaggeration that should excite the suspicions of any one conversant with the hysterical character.

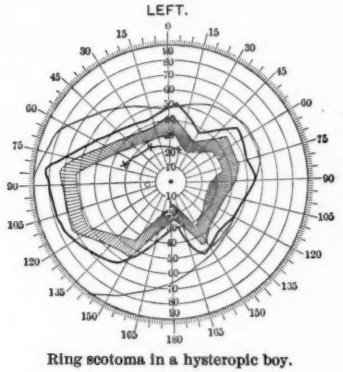
Ring Scotoma. Most observers regard defects in the field of an annular character as presumptive evidence of the presence of hysteria, and, although I should hesitate to rely upon this sign alone in the diagnosis of the neurosis, I have never seen a well-marked instance of its presence where other indications of hysteria were wanting. The following case is so typical that I give it, with the perimeter charts.

Case VII. *Hysterical asthenopia, with "ring" scotoma and paresis of accommodation, in a young hysterope.*—W. H., aged seventeen years, is a member of a decidedly neurotic family, and has complained of a number of nervous symptoms most of his lifetime. His family physician informs me that he has had and still presents several hysterical stigmata. His school-life has been frequently interrupted by ocular headaches and inability to use his eyes, owing to fatigue and blurring of print. During the past year he has grown and developed abnormally, and looks as if he were twenty years of age. He complains of lassitude and constant fatigue on any exertion. His central vision is good, except that he has 1 D. of hyperopia, and his eye-muscles are normally balanced. He exhibits a marked paresis of accommodation. In either eye, without glasses, the accommodative range is 18″—28″; with a 2 D. + glass it is 9″—25″, with some transient blurring. A careful exploration of his visual fields discovered a curious condition of affairs—the so-called

"ring scotoma"—the area of blindness not affecting the extreme periphery of the field nor the central region, but covering an area, roughly speaking, about 10° wide on either side of a parallel of latitude (Figs. 5, 6, 7, and 8.)

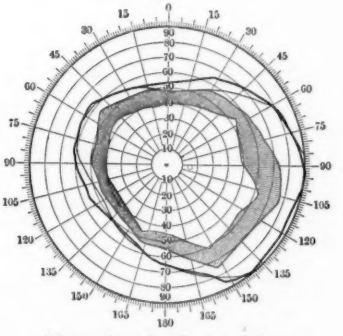
These varied in size and situation from time to time as the patient grew better. Complete rest, tonics, massage, and faradization were resorted to, and finally the patient was sent on a three-months' camping excursion to the Rocky Mountains, where he practically recovered.

FIG. 5.



Ring scotoma in a hysteropic boy.

FIG. 6.



Ring scotoma in a hysteropic boy.

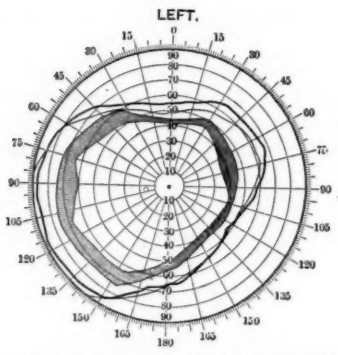
The scotoma has not, so far, entirely disappeared, but all the other hysterical symptoms have, for the time at least, greatly improved. Figs. 5 and 6 show the visual fields taken early in the case, and Figs. 7 and 8, a month afterward.

Anæsthesia of the Palpebral Skin. I have often examined cases of hysterical amblyopia for anæsthesia of the palpebral skin and ocular conjunctiva—noted by Gilles de la Tourette—and have usually found

it when hemianæsthesia is also present or where the pharyngeal reflex is wanting or dulled. In other words, the orbicular area shows a want of sensibilty in common with other regions that are most often affected in hysteria.

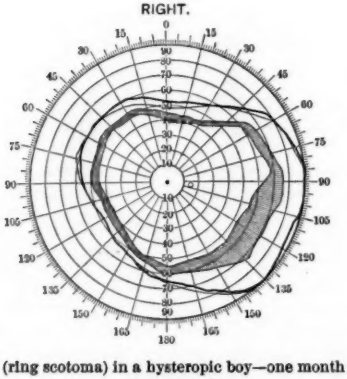
Pseudo-paralytic Ptosis. This is another purely hysterical stigma. This rather unusual symptom, unlike organic paralysis, is almost always accompanied by other signs of hysteria, especially reflex photophobia,

FIG. 7.



Ring scotoma in hysteropic boy—one month after first perimetric examination.

FIG. 8.



Field of vision (ring scotoma) in a hysteropic boy—one month after former measurement.

blepharospasm. The eye closes quickly when the hysterical lid is raised; slowly in true paralysis. In unilateral hysterical ptosis, as Charcot observed, the eyebrow is lower on the healthy side; higher in true paralysis.

Traumatic Hysteria. Suspicion should be aroused by the appearance of any of the symptoms above detailed if they show themselves after an injury, however trifling, if it be accompanied by mental shock. My personal experience has been that a majority, or large minority, of examples of ocular hysteria belong to the so-called *traumatic neuroses.*

It must not be forgotten that just as hysteria simulates most organic lesions, it may also be present with them. Patrick has, among others, recently emphasized this important fact, and has reported cases illustrative of it. The eye is no exception to this rule, but fortunately organic alterations in the ocular structures, as examined by the ophthalmoscope, perimeter, etc., usually speak for themselves, and present characters entirely unlike those of a purely functional affection.

In conclusion: 1. Most cases of hysteria present well-marked, easily-detected eye-signs and symptoms.

2. A few ocular symptoms, such as reversal of the relation of the color-fields and the field for white, the tonic form of blepharospasm, spasm of accommodation and convergence, and pseudo-paralytic ptosis, may be regarded as pathognomonic of hysteria.

3. Defects of vision (in the absence of refractive errors, accommodative anomalies, and fundus lesions) are, generally speaking, hysterical if accompanied by photophobia and any form of blepharospasm.

4. No examination of a patient for hysteria should be regarded as complete without considering the condition of his ocular apparatus.

5. Where there is no conclusive external evidence of the neurosis present, the perimeter should be carefully used, the range of accommodation should be noted, and the ophthalmoscope employed.

6. It should always be remembered that ocular hysteria is common in children and men.

7. Organic disease (traumatism especially) of the eye may accompany purely functional disturbances of that organ.

For the benefit of those who wish further to pursue this interesting and important matter I append the titles of a few monographs on the subject.[1]

[1] "Traité clinique et thérapeutique de l'hystérie," 1891. Par Gilles de la Tourette.
Charcot's "Lessons on Diseases of the Nervous System."
"De l'amblyopie liée à l'hémianesthésie et spécialement de l'amblyopie hystérique. Thèse de Paris," 1886.
"Ueber Sehstörungen bei functionellen Nervenleiden." Wilbrand und Sänger. Leipzig, 1892.
"Ueber neurotische Asthenopie und die sogennanten Anæsthesie retinæ." Wilbrand. Archiv für Augenheilk., xii., 1893.
Finally, a fair account of ocular hysteria may be read in the fourth volume of Norris and Oliver's "System of Diseases of the Eye," written by Parinaud and translated by myself.

EXPERIMENTAL STUDIES ON THE PREPARATION AND EFFECTS OF ANTITOXINS FOR TUBERCULOSIS.

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and

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(Concluded from p. 707, December, 1898.)

Part II.

Tests of the Antitoxic Power of Serums in Tuberculin Poisoning.

In these experiments we have considered:

1. Fatal doses of tuberculin* in sound animals.
2. Fatal doses in tuberculous animals.
3. Small doses in tuberculous animals to show the effect: (*a*) on the temperature; (*b*) on the local reaction.

Many difficulties present themselves in any attempt to demonstrate a specific antitoxin in tuberculosis by methods analogous to those used so satisfactorily in diphtheria. The principal of these relate to the difficulty of obtaining a highly poisonous product in small bulk unless tuberculous instead of sound animals are employed for the tests.

Objections can easily be made to the use of tuberculin and diseased animals for testing serums. In the first place, tuberculin when prepared by boiling heat may not represent the unaltered toxins of tuberculosis, though containing more toxic extractive substances from the bacilli than when made by evaporation of cultures at low temperatures. Yet we cannot safely say that tuberculin is a wholly altered product until we have further knowledge of its chemical nature. We know, indeed, that boiling heat not too prolonged does not destroy its most prominent physiologic action on tuberculous animals.

The propriety of using tuberculin in serum tests principally depends upon the view one may take of the character of the peculiar reaction. That question may need further elucidation, but it seems to us that the best explanation we have from observations up to date supposes tuberculin to be a *partly specific irritant, both to tuberculous foci and to the susceptible organism in general.* The local and general reaction is caused partly by the poison contained in the tuberculin, which irritates the sensitized cells composing the tubercle, and partly by those toxins set free by the hyperæmia or the enzyme (?) action directly or indirectly produced by the dose of tuberculin (see Bâbes and Proca[7]). Whether the toxins

* Under the term "tuberculin" we here include the various extracts of tubercle bacilli, but usually mean the original Koch fluid.

liberated are the same, chemically, as those obtained from artificial cultures of tubercle bacilli is not easy to determine; but that some are set free seems obvious from the profound general disturbance brought about by a minute dose of tuberculin. According to this theory, the poisons are stored up in the tubercles, and in part at least derived from the dead or weakened bacilli, as shown by Bâbes and Proca[7] in experiments with dead tubercle bacilli. Crookshank and Herroun[23] and Matthes[63 61] have extracted albuminous poisons out of caseous material from tuberculous lesions which had the properties of tuberculin. Kahler[43] and Lenoir[51] found albumoses in the urine of patients being treated with tuberculin, which produced tuberculin reactions and were present in the urine in excess of the amount injected as tuberculin. Thus we have some evidence of the discharge of accumulated pyrogenic substances; and that the tuberculin injected, in the minute dose necessary to cause the reaction, may not itself play the prominent part as a poison, but rather as the excitant to the discharge of other specific poisons.

Therefore, but for the uncontrollable amounts of hoarded toxin exploded, as it were, coupled with the local congestions, there would be no objection to proving the activity of serums in this way. Given the serum of a tuberculous animal which had been treated with tuberculin and had tolerated the reactions well, we might hope, if an anti-body had been in the serum, that it would be effective against the specific poisons developed in the animal body by tuberculosis, though not necessarily against tuberculin as obtained from cultures. By analogy, such an antitoxin ought also to manifest its activity on other tuberculous animals injected with a dose of tuberculin just large enough barely to produce a reaction (and at the same time with a dose of such serum sufficient surely to neutralize it). Should it be weak in activity, it would still seem possible to obtain some effect in that way. Furthermore, it might reasonably be expected that the fatal effects of doses of tuberculin just sufficient to cause death in tuberculous animals with uniform lesions might be inhibited by the administration of an efficient serum; or, at least, that the lives of the animals might be appreciably prolonged. Such tests ought to give qualitative results, though, from the unknown quantities of toxin to be dealt with, they manifestly would not serve as quantitative standards for serums.

On the other hand, healthy animals cannot be suitable for tests until we can obtain sufficiently toxic unaltered products of tubercle bacilli; while if the serums proved to be wholly or chiefly bactericidal, and not antitoxic, they would not reveal that fact in non-tuberculous animals.

As is well known from Koch's original experiments, healthy guinea-pigs tolerate very large doses of tuberculin. This fact renders it nec-

essary to employ such a quantity of ordinary tuberculin to produce death that the effects of the unaltered ingredients of the culture fluid, such as glycerin, albumoses, or peptone, should be remembered, as well as the shock produced by the traumatism of large injections.

We occupied ourselves for some time in attempts to produce a concentrated tuberculin or toxin from cultures; but while it is comparatively easy to produce tuberculin, even from non-virulent cultures, which will usually be fatal in doses of 1 c.c. to 100 grammes of pig (the strength of toxin mentioned by Maragliano as used to test his serum), yet this ratio did not suffice in our experiments to kill pigs weighing above 250 grammes. In addition to the objections mentioned, we found its absorption from under the skin very uncertain.

We then sought by precipitation from cultures on proteid-free media to obtain a pure toxin which would be fatal in small doses. We also attempted to procure a concentrated poison from the bacilli by using weak alkaline extracts, but none of our preparations were quickly fatal to healthy animals in small doses, though producing cachexia and death after some time. After testing various preparations subcutaneously and intraperitoneally, without encouragement, we abandoned the idea of utilizing healthy animals for antitoxin or antituberculin tests. In the course of this work we used fifty guinea-pigs, weighing from 150 to 450 grammes. More recently, fresh extracts from crushed, living tubercle bacilli gave no more uniform fatalities.

Clinical experience with human tuberculosis confirms the fact that the poisons are of relatively low toxicity—where their immediate effects are considered—as compared with those of diphtheria, tetanus, etc. The same fact suggests itself as a reason for the indifferent results of experiments in sero-therapy with tuberculosis. The effect of tuberculin administered to an animal after the disease becomes established is, nevertheless, so powerful, and the dose so small, that the objections mentioned do not enter.

A surely fatal dose of tuberculin for a tuberculous guinea-pig, though not uniform, is small enough for testing serums; yet there are other factors which are not to be disregarded in such experiments, and which are very difficult to control. The local reaction varies considerably in intensity in the same series of animals. Differences in virulence of the inoculation material used, variations in lesions and in the extent of caseation, the age, and the frequent pregnant state of the animals, suffice to require large numbers of animals in any experimental work on tuberculosis. All these factors we found especially important in testing for anti-tuberculin.

For the reasons mentioned, the fatal dose of tuberculin necessarily varies. Differences in the stage of the disease, the injection of serums mixed with tuberculin, or given separately may produce diverse results

owing to different rate of absorption* or other reasons. We also found that non-tuberculous serums, and even physiological salt solution when used under like conditions, gave results that dampen over-enthusiasm in making deductions. Yet in the experiments that follow, in the course of which two hundred and fifty pigs were used, there can be seen indications of a favorable influence or possibly an antitoxic effect from some of the serums on tuberculous guinea-pigs tested with fatal doses of tuberculin.

Details of the Methods Used to Test the Antitoxic Power of Serums.

Guinea-pigs were inoculated in lots of ten to twenty, at different times, with cultures or other tuberculous material of varying virulence. The point of inoculation was usually below the right groin in the subcutaneous tissue.

The amount of tuberculin used to kill them varied from 0.100 to 0.500 grammes, according to the stage and type of disease in the animals; it was made from non-virulent bouillon cultures. The same bottle was used in nearly all the tests. To test the effect on temperatures doses of 0.001 to 0.002 were employed.

The doses of serum ranged from 1 to 12 c.c. Some lots were tested with doses of serum and tuberculin proportioned to the weight of the pigs.

Loss of weight and strength were taken as the most practical criteria of the condition of the diseased animals at the time of testing.

The tests were made from twenty-one to fifty-six days after infection.

To avoid false deductions from lack of absorption of tuberculin when mixed with serum, it was given separately in most of the experiments.

Serums were injected at the same time or before the tuberculin, subcutaneously, or, in some instances, intraperitoneally; the tuberculin always under the skin. Temperatures were taken in the rectum at the time of injection and six hours later. Some of the surviving animals were usually killed for comparison after twenty-four hours.

Normal horse serum, diphtheria antitoxin, normal sheep serum, 0.6 per cent. NaCl solution, and hydrocele fluid were used to control antituberculosis serums in comparative tests.

Serum of Ass R, First Bleeding.

March 23, 1896. 16 guinea-pigs of an average weight of 692 grammes were inoculated in the groin with a non-virulent sputum, which kills in from 60 to 100 days.

May 7th. We tested 12 *pigs on the forty-fifth day.* Each received serum subcutaneously in doses of from 1 to 8 c.c. mixed in 7 instances with

* The slow absorption of the infiltration produced by injections under the skin of guinea-pigs of sheep, cow, ass, and rabbit serums was a point specially noted by us in all this work, and has been of late particularly contrasted with the better absorption of horse serum by Uhlenhuth.[90]

0.300 c.c. of tuberculin. (I.) Of the 7 pigs that received serum and tuberculin 5 survived, while 2 died in from 13 to 15 hours. (II.) The 2 pigs that were injected with serum only survived and showed no effect. (III.) 3 pigs, controls, received tuberculin only and died in from 9 to 10 hours. Three days later (II.) received 0.300 c.c. tuberculin and died in from 10 to 12 hours.

Result. The infiltrate was not well absorbed. The lesions were not very uniform, but the result seems favorable to the serum, except that there was an insufficient number of controls. No protection was seen when the serum was given three days before the tuberculin.

May 13, 1896. 4 *pigs were tested on the fifty-first day.* The serum was given intraperitoneally in doses of from 8 to 10 c.c.; the tuberculin subcutaneously in simultaneous doses of 0.300 c.c. 2 pigs that received serum and tuberculin died in 10 to 12 hours; 2 pigs used as controls and receiving tuberculin only died in 10 hours.

Result. Inconclusive; there was no better absorption of the serum infiltrate.

April 28*th.* 12 pigs of an average weight of 529 grammes were inoculated in the groin with sputum that was of moderate virulence (though two died in from 28 to 29 days).

May 28*th.* 10 *pigs were tested on the thirtieth day.* The serum was given subcutaneously in simultaneous doses of from 3 to 12 c.c. Tuberculin in a separate place in divided doses: 12 M., 0.300 c.c.; 6 P.M., 0.200 c.c. Of 7 pigs that received serum and tuberculin, 3 survived, while 4 died in from 9 to 10 hours; control, of 3 pigs receiving tuberculin, only 2 survived; 1 died in 15 hours.

Result. The serum infiltrate was not well absorbed, though the depression from the tuberculin was not marked until after the second dose. The controls had a higher temperature following the first dose. The lesions were not uniform and the controls were too few. No conclusion was warranted.

July 11, 1896. 20 pigs of an average weight of 496.7 grammes were inoculated intraperitoneally with a small drop of the juice of very virulent tuberculous tissue.

August 1*st.* *We tested* 10 *pigs on the twenty-first day.* All were very ill with acute tuberculosis. Serum was given intraperitoneally; tuberculin subcutaneously at the same time to 7 pigs; the dose of the tuberculin was 0.400, of the serum 2 to 8 c.c. 1 survived, while 6 died in from 6 to 22 hours; 3 control pigs that received tuberculin only died in 9 hours.

Result. Autopsies revealed acute miliary tuberculosis very much alike in all. The amount of serum absorption was doubtful. The result seemed slightly favorable to the serum, but the condition of the animals was bad for the test.

Serum of Ass H, First Bleeding.

May 27, 1896. 10 pigs of an average weight of 534 grammes were inoculated in the groin with a non-virulent sputum, which kills in 60 days.

July 17*th.* *They were tested* (*fifty-first day*). Serum was given intraperitoneally in doses of from 2 to 10 c.c.; tuberculin subcutaneously in simultaneous doses of 0.400 c.c. Of 5 pigs that received serum and tuberculin 2 survived and 3 died in from 6 to 9 hours; of 5 control

pigs that received tuberculin only 3 survived, while 2 died in from 6 to 11 hours.

Result. The serum evidently was not absorbed to any extent. The lesions were not uniform, though the controls were of sufficient number to neutralize that objection. Evidently no conclusion was warranted, as too many controls survived.

July 11, 1896. 10 pigs from a lot of 20 were inoculated intraperitoneally with very virulent material (see previous experiment, July 11th); 2 pigs that died were not used; all became very ill.

August 1st. 8 pigs were tested (twenty-first day). Serum was given intraperitoneally in doses of from 2 to 8 c.c.; tuberculin subcutaneously in simultaneous doses of 0.400 c.c. Of 4 pigs that received both serum and tuberculin 1 survived and 3 died in from 5 to 10 hours; the 4 controls that received tuberculin only died in from 6 to 10 hours.

Result. The lesions were very uniform and were those of acute miliary tuberculosis. The serum was probably unabsorbed, and the condition of the animals was bad for the test. No conclusions were warranted.

Comparisons Between Various Serums, etc.

The following experiments were made to compare the effects of various serums when given with and without tuberculin. In explanation of the serums tried which were other than our own products, it may be stated that:

"Cow D." Was obtained from an animal that had recovered from pulmonary tuberculosis and had been injected with large quantities of tuberculin.

"Horse I." Was said to have been treated with tuberculous "toxins" from virulent cultures without bacilli.

"Horse II." Had been inoculated subcutaneously with non-virulent cultures.

"Horse III." Was said to have been treated with "toxins" from virulent bacilli freed from the culture fluid.

"Ass M." Was a tuberculinized healthy ass.

In addition to the anti-tuberculous serums we used normal horse serum, diphtheria antitoxin from the New York City Board of Health, sheep serum from a healthy sheep, and a 0.6 per cent. NaCl solution.

July 28, 1896. *To test the serum from cow D,* 10 pigs of an average weight of 714 grammes were inoculated in the groin with virulent tissue juice from a tuberculous pig; 5 died before the test in from 40 to 50 days.

September 28th. We tested 5 pigs on the sixty second day. Serum was given subcutaneously, mixed with tuberculin; to 3 pigs, the serum in doses of 5, 5, and 8 c.c., the tuberculin in a dose of + 0.400 c.c.; all died in from 4 to 7 hours; 2 control pigs received 0.400 c.c. of tuberculin and both died in from 3 to 5 hours.

Result. All the serum was absorbed. The lesions were uniformly advanced caseous tuberculosis. No conclusion could be drawn, as the dose of tuberculin was probably excessive.

August 24, 1896. *To test the serums from cow D and horse I,* 10 pigs

of an average weight of 714 grammes were inoculated in the groin with virulent tissue juice from a tuberculous pig; 2 died on the 43d day.

October 7th. We tested 8 pigs on the forty-fourth day. Serum was given subcutaneously, mixed with tuberculin; 3 pigs receiving the serum from cow D in doses of 2.8, 2.6, and 2.7 c.c. + 0.300 tuberculin died in from 6 to 8 hours; 2 pigs that received the serum from horse I in doses of 2.36 to 2.64 c.c. + 0.300 tuberculin died in 8 hours. Of 3 controls that received 0.300 c.c. tuberculin only 1 survived and 2 died in 8 hours.

Result. The serum infiltrate was not well absorbed, and the dose of tuberculin was too large. No effects favorable to the serums could be seen.

October 12, 1896. *We tested the serums of cow D and ass H, first bleeding.* 10 pigs of an average weight of 657.4 grammes were inoculated in the groin with a pure culture of virulent tubercle bacilli that killed in from 40 to 50 days.

They were tested on the thirty-second day. Serum was given subcutaneously to guinea-pigs in dose of 0.005 to 1 gramme of pig, diluted with equal quantities of a 0.6 per cent. NaCl solution. Tuberculin in a dose of 0.0006 to 1 gramme of pig, diluted, was given subcutaneously 30 minutes later, on the opposite side of the abdomen; 5 pigs received the serum of cow D in doses of from 2.5 to 2.75 c.c. and tuberculin in amounts of from 0.250 to 0.450; 1 survived, 4 died in from 10 to 14 hours; 2 pigs received the serum of ass H in doses of 2.5 and 2.75 c.c. and tuberculin in doses of 0.250 and 0.450; both died in from 9 to 10 hours; 3 controls received tuberculin only in doses of from 0.250 to 0.450 and died in from 9 to 13 hours.

Result. The serum was incompletely absorbed, except in the pig that survived. The lesions were very uniform and showed generalized tuberculosis with beginning caseation. Very little, if any, protective influence of the serum could be seen.

August 23, 1897. *Serum of horse II.* 5 pigs of an average weight of 508 grammes were inoculated in the right groin with a virulent first culture.

September 25th. They were tested on the thirty-third day. 3 pigs received serum subcutaneously in a dose of 0.005 to 1 gramme of pig and tuberculin in a dose of 0.200; 1 survived, 2 died in 12 hours; 2 pigs received tuberculin only in the same dose and died in 12 hours.

Result. Slightly favorable to serum protection in one pig.

The following experiment is so instructive that we give the full details in tabular form. The apparently marked protective influence exerted by both the serums and the physiological salt solution illustrates the fallacies in deductions of supposed specific effects of the serum as determined by such tests.

November 23, 1896. *We tested the serums of horse II, rabbit VIII, and ass R in a* 0.6 *per cent. NaCl solution.* 19 pigs of an average weight of 517 grammes were inoculated with a pure culture of tubercle bacilli of moderate virulence that killed in from 50 to 60 days.

We tested 13 *pigs on the forty-second day* with serum and salt solution, in a dose of 0.006 to 1 gramme of pig, diluted with an equal quantity of water; it was given subcutaneously in the right side, and tuber-

culin in a dose of 0.0002 to 1 gramme of pig, diluted with water, was given subcutaneously, 45 minutes later, in the left side. 5 pigs received the serum of horse II in doses of 2.58 c.c. to 3.90 c.c.; 1 died in 15 hours, 4 survived; 2 pigs received the serum of rabbit VIII in doses of 3.48 to 3.51 c.c. and both survived; 6 controls received tuberculin only, and all died in from 7 to 11 hours.

We tested 5 pigs on the forty-fifth day. 1 pig that received 2.70 c.c. of the serum of ass R survived; 2 pigs that received 0.6 per cent. NaCl, 3.00 to 3.19 c.c., survived; 2 controls died in 10 hours. See Table I. (A) and (B).

Result. The lesions in this lot of animals were very uniform, and the favorable showing for the serums seemed more than a coincidence. The tuberculin reaction was typical in the organs, the spleens being enormously enlarged and ecchymotic; there was free serum in the cavities; other local congestions were marked. The serum infiltrate seemed to be absorbed but slightly in most animals, even after two days.

The results seen in Tables I. (A) and (B) led us to make comparative tests of various non-specific serums and of salt solution under the same conditions. The number of animals in some cases was too small to make the results of any value, but they are suggestive. Some experiments are conveniently tabulated.

November 13, 1897. *The serum of horse II and normal horse serum "N."* 27 pigs of an average weight of 537 grammes were inoculated in the right groin with a culture of fair virulence; 5 died. The serums and tuberculin were given subcutaneously and in different places 45 minutes apart; the serum in doses of 0.006 to 1 gramme of pig, the tuberculin in doses of 0.200 to 0.500 in pigs Nos. 1 to 15, and in doses of from 0.100 to 0.500 in pigs Nos. 15 to 23. Of 8 pigs that received the serum of horse II, 2 survived and 6 died in from 9 to 15 hours. 6 pigs received the serum of horse "N," 2 survived, while 4 died in from 10 to 18 hours. (See Table II.)

Result. The lesions were fairly uniform, but the test was too equivocal for any value, and the serum infiltration was not so well absorbed as in Table I.

November 2, 1896. *Hydrocele fluid.* 3 pigs were inoculated with a culture of tubercle bacilli of moderate virulence.

They were tested on the sixty-sixth day. Hydrocele fluid (0.006 to 1 gramme of pig) was injected subcutaneously after diluting it one-half; tuberculin, in a dose of 0.0002 gm. to 1 gramme of pig, was given subcutaneously 15 minutes later. (See Table III.)

Result. No conclusion could fairly be made.

December 30, 1896. *We tested the serums of horse I, ass R 2d, ass H 2d, and a 0.6 per cent. NaCl solution.* 16 pigs of an average weight of 558.5 grammes were inoculated in the right groin with a virulent pure culture, that killed in from 30 to 50 days.

They were tested on the fortieth day. The serum of horse I was given in a dose of 0.006 to 1 gramme of pig; the serum of ass R 2d, the serum of ass H 2d, and a 2 per cent. of NaCl, 0.006, were given in the same dose; the tuberculin was given in a dose of 0.0002 to 1 gramme of pig, 40 minutes after the serum. The serum was given subcutaneously on the left side; the tuberculin on the right side; both were diluted one-half with water. (See Table IV.)

TABLE I (A).—TEST OF 13 PIGS ON FORTY SECOND DAY.

No.	Weights. XI/23,'96	Weights. I/4, '97	Gain or loss.	Serum, kind.	Serum, 12 M. Dose.	Tuberc. 12.45 P.M. Dose.	Temp. 12 M.	Temp. 7 P.M.	Condition. 7 P.M.	Died. Hour.	Died. Hours.	Days survived or killed.	Autopsies.
1	430gm.	430gm	0gm.	Horse II	2.58 c.c.	0.086	102.5°	103°	Lively	.....	.....	Survived 17 days	General caseous tuberculosis.
2	680	645	—35	"	3.87	0.129	103.5	101	Fair	.....	.....	Survived 16 days	General caseous tuberculosis (less).
3	460	465	+ 5	"	2.79	0.093	103	101	"	.....	.....	Killed 2d day	Acute tuberculosis, beginning caseation; some infiltrate at site of injection.
4	660	650	—10	"	3.90	0.130	103	102	"	.....	.....	Survived 14 days	General caseous tuberculosis.
5	465	460	— 5	"	2.76	0.092	103.5	101	"	3 A.M.	15	.....	Acute tuberculosis; ruptured spleen; serum partly unabsorbed.
6	610	580	—30	Rabbit I	3.48	0.116	102.5	101	Weak	.....	.....	Survived 1 day	Acute tuberculosis; serum all absorbed.
7	565	585	+20	"	3.51	0.117	102.8	103	Depressed	.....	.....	Survived 1½ day	" " " " "
8	685	620	—65	Control	0	0.124	103.3	95	Dying	9.30 P.M.	9	.....	" miliary tuberculosis; beginning caseation.
9	535	675	+140 (pregn't)	"	0	0.135	102	97	Weak	.....	9	.....	" " " " " "
10	562	550	—12	"	0	0.115	102	98.5	Depressed	10 30	11	.....	" " " " " "
11	540	540	0	"	0	0.108	101.5	105	Weak	.....	11	.....	" " " " " "
12	490	465	—25	"	0	0.093	103.5	.....	Dying	7.30	7	.....	" " " " " "
13	505	515	+10	"	0	0.092	103.5	101	Weak	9.30	9½	.....	" " " " " "
14	590	.....	.....	.....	.....	.....	.....	.....	.....	Dec. 28, 1896		35th day of disease	

TABLE I (B).—TEST OF 5 PIGS ON FORTY-FIFTH DAY.

No.	Weights.	Weights. I/7,'97			12.30 P.M.	1 P.M.	12.30 P.M.	7.30 P.M.					
15	425 gm.	450 gm.	+25 gm.	Ass R.I.	2.70 c.c.	0.090	101°	104.5°	Lively	.....	.....	Killed 2d day	General miliary tuberculosis; beginning caseation; serum infiltrate still under skin.
16	425	500	+75	NaCl	3.30	0.100	101.6	102	Weak	.....	.....	" "	" NaCl solution absorbed.
17	390	365	—25	"	3.19	0.073	102.5	106	Lively	.....	.....	" "	" " " " " "
18	485	435	—50	Control	0	0.097	101.5	99.5	Weak	11 P.M.	10	.....	" " " " " "
19	499	525	+26	"	0	0.108	102	101.8	"	"	10	.....	" " " " " "

TABLE II.—TESTED 23 ON FORTY-SECOND DAY.

No.	Weight.			Serum, kind.	Serum, 12 M. Dose.	Tuberc. 12.45 P.M. Dose.	Temp.		Condition.		Died. Hours.	Survived or killed.	Autopsies.
	XI/13,'97	XII/25,'97	Gain or loss.				12 M.	6 P.M.	12 M.	6 P.M.			
1	662gm.	580gm.	—82gm.	Horse II	3.48 c.c.	0.232c.c.	102°	96°	Good	Fair	15	.....	General tuberculosis; beginning caseation of liver and spleen; some infiltrate from the serum.
2	600	480	—120	"	2.88	0.192	103.5	97	"	"	9	.....	General tuberculosis; beginning caseation, liver, etc.; serum infiltrate unabsorbed.
3	490	400	—90	"	2.40	0.160	100	97.5	Poor	Weak	10	.....	General tuberculosis; more caseation of liver.
4	470	360	—110	N	2.16	0.144	100.6	98.5	Fair	"	10	.....	General tuberculosis; beginning caseation; serum infiltrate unabsorbed.
5	620	565	—55	0	0	0.226	101.5	102	"	Fair	...	28 hours	General tuberculosis; beginning caseation; spleen not large.
6	560	500	—60	0	0	0.200	101.8	102	"	"	...	Surv. 12 dys	Gen. tuberc.; slight caseation; spleen not large.
7	490	415	—75	N	2.49	0.166	102.6	96.5	"	"	10	.....	General tuberculosis; more caseation; serum infiltrate unabsorbed.
8	425	380	—40	II	2.28	0.152	103	98.5	Poor	"	15	.....	General tuberculosis; slight caseation; serum infiltrate fairly absorbed.
9	405	360	—45	0	0	0.144	101.5	96	Good	Weak	10	.....	General tuberculosis; beginning caseation.
10	365	340	—25	II	2.04	0.136	102.8	102	"	Fair	...	Surv. 22 dys	General tuberculosis; slight caseation; marked caseation of the lungs.
11	355	340	—15	0	0	0.136	103.8	104.5	"	"	...	" 45 "	General tuberculosis; marked caseation.
12	385	340	—45	N	2.04	0.136	103.8	103.5	Fair	"	...	" 18 "	Gen. tuberc.; marked caseation except spleen.
13	465	430	—35	II	2.58	0.172	102.2	96.5	Good	Weak	10	.....	General tuberculosis; beginning caseation; serum infiltrate unabsorbed.
14	435	360	—75	0	0	0.144	104.4	105	Poor	Fair	...	Surv. 22 dys	Gen. tuberc.; more caseation; marked in lungs.
15	350	370	+20	0	0	0.074	102.5	101.8	Good	"	15	.....	General tuberculosis; beginning caseation.
16	555	560	+ 5	N	3.36	0.112	102.2	100	"	Strong	...	Surv. 37 dys	General tuberculosis; massive caseation in lungs; not in liver or spleen.
17	500	510	+10	N	0	0.102	102.2	102	"	"	15	.....	General tuberculosis; beginning caseation.
18	705	560	—145	0	0	0	97	.....	Weak	Weak	12	Not treat'd; too weak	General tuberculosis; advanced caseation of liver and spleen.
19	495	430	—65	0	0	0.086	103.6	95	Fair	Fair	10	.....	General beginning caseous tuberculosis.
20	470	430	—40	II	2.58	0.086	102	100	"	"	15	.....	General beginning caseous tuberculosis; serum fairly absorbed.
21	560	525	—35	0	0	0.105	103	100.5	Good	"	18	.....	Ruptured liver; general tuberculosis.
22	395	400	+ 5	II	2.40	0.080	102.5	103	"	"	...	Surv. 5 dys	General tuberculosis; beginning caseation; spleen small.
23	400	340	—60	N	2.04	0.068	102.5	99.8	"	Weak	18	.....	General tuberculosis; slight beginning caseation; serum unabsorbed.

TABLE III.

No.	Weights.			Serum.		Tuberc. 12.45 P.M. Dose.	Temp.		Condition. 7.30	Died or killed.		Autopsies.
	XI/2,'96.	1/7,'97	Gain or loss.	Kind.	12.30 P.M. Dose.		12.30 P.M.	7.30 P.M.		Hours.	Days.	
1	705gm.	610gm.	— 95gm.	NaCl	3.66 c.c.	0.122 c.c.	102.4°	100°	Fair	24	1	General caseous tuberculosis; serum infiltrate not absorbed from skin.
2	710	510	—200	Control	0	0.102	95	.....	Dying	8	.....	General caseous tuberculosis.
3	710	630	— 70	"	0	0.126	102	103.2	Fair	...	VI/2,'97	Chronic caseous tuberculosis (Albino).

TABLE IV.

No.	Weights.			Condition.	Serum.		Tuberc. Dose.	Temp.		Condition. 6 P.M.	Died or killed.		Autopsies.
	XII/30,'96	11/8,'97	Gain or loss.		Kind.	Dose.		12 M.	6 P.M.		Hours.	Days.	
1	655gm.	625gm.	—30gm.	Fair (doe)	Ass R	3.75 c.c.	0.125c.c.	103°	100.4°	Fair	15	.....	General caseous tuberculosis; serum infiltrate not all absorbed.
2	545	585	—60	"	" "	2.90	0.097	102.2	102.6	"	...	K. 10	General caseous tuberculosis.
3	610	545	—65	Poor	Ass H	3.27	0.109	102.4	103.4	"	...	2½	General caseous tuberculosis; serum well absorb'd
4	640	585	—55	Good	" "	3.50	0.117	102.6	99.2	Weak	10	.....	General caseous tuberculosis; serum infiltrate not well absorbed; more caseation.
5	670	620	—50	(doe) "	Horse I	3.72	0.124	102.4	103.2	Fair	...	K. 9	General caseous tuberculosis; moderate caseation
6	445	385	—60	Poor	" "	2.30	0.077	102.6	99.6	Weak	...	D. 9	General caseous tuberculosis; slight beginning caseation.
7	525	410	—115	Ill	NaCl	2.46	0.082	101.4	103.2	Fair	15	.....	" " " "
8	490	425	—65	Fair (doe)	"	2.55	0.095	103	104	"	...	K. 10	" " " "
9	525	440	—85	Poor	Control	0	0.088	101.2	95	Weak	15	.....	" " " "
10	525	470	—55	Good	"	0	0.094	103.2	101.4	"	9	.....	" " " "
11	620	610	—10	"	"	0	0.122	102.2	104.5	Fair	...	K. 9	" " " "
12	655	.....	.....	.....	.....	.....	.....	.....	.....	.....	Died	1/10,'97	Emaciated; acute peritonitis.
13	480	.....	.....	.....	.....	.....	.....	.....	.....	.....	"	1/11,'97	Emaciated; nearest lymph nodes tuberculous.
14	450	.....	.....	.....	.....	.....	.....	.....	.....	.....	"	1/27,'97	Emaciated; nearest lymph nodes and spleen tuberculous.
15	590	.....	.....	.....	.....	.....	.....	.....	.....	.....	"	11/6,'97	General caseous tuberculosis.

Result. These animals revealed fairly uniform lesions much like those in Tables I. (A) and (B), and at nearly the same stage in the disease. All had caseous retroperitoneal lymph nodes; enlarged, and beginning caseous, liver and spleen, and miliary tuberculosis in the lungs. The amount of caseation varied, being somewhat less in Nos. 6, 7, 8, and 11 (Table IV.) than in the rest. This latter factor seemed to influence the severity of the poisoning by tuberculin, which is usually more marked the greater the caseation and the age of the disease. Therefore the experiments in Tables III. and IV. have little use for safe deductions.

January 5, 1897. *We tested the serums of cow D, ass R* 2*d, a normal sheep, and* 0.6 *per cent. NaCl solution.* 10 pigs of an average weight of 483.4 grammes were inoculated with a culture of tubercle bacilli of moderate virulence from the same source as in the experiment of November 23, 1896.

February 16*th. We tested them on the forty-second day.* The serums, etc., were given subcutaneously, diluted with an equal volume of 0.6 per cent. NaCl, giving 0.004 to 1 gramme of pig; tuberculin, diluted, was given subcutaneously, 45 minutes later, in a dose of 0.0002 to 1 gramme of pig; 2 pigs that received the serum of cow B died in from 12 to 20 hours; of 2 pigs that received the serum of ass R 2d, 1 survived and 1 died in 12 hours; of 2 pigs that received the serum of a sheep (normal), 1 survived and 1 died in 9 hours; 2 pigs received NaCl in 0.6 per cent. solution, and died in from 9 to 10 hours; 2 controls died in from 9 to 12 hours.

Result. The infiltrations from the ass and cow serums were not well absorbed; the others were entirely so. The NaCl seemed completely absorbed when the tuberculin was given. The lesions were very uniform. Possibly some protection was shown by the serums.

January 20, 1897. *We tested the serums of horse II and diphtheria antitoxin* (300 *units*). 10 pigs of an average weight of 529.2 grammes were inoculated in the groin with a culture of tubercle bacilli of moderate virulence (2 died before testing).

February 26*th. We tested* 8 *pigs on the thirty-seventh day.* The serums were given subcutaneously, diluted with an equal volume of water in a dose of 0.005 to 1 gramme of pig (2 to 4 c.c.); the tuberculin, diluted, was given subcutaneously, 40 minutes later, in a dose of 0.0006 to 1 gramme of pig (0.234 to 0.489 c.c.); 4 pigs that received the serum of horse II died in from 7 to 11 hours; of 2 pigs that received diphtheria antitoxin, 1 survived, while 1 died in 6 hours; 2 controls died in from 8 to 11 hours.

Result. The serums were not perfectly absorbed and the dose of tuberculin was so large that no deduction is warranted.

Note.—These animals had been used on the twenty-second day of the disease with the serum of ass R 1st and small doses of tuberculin (see experiment of January 20, 1897).

February 19, 1897. *We compared the serum of ass R, second bleeding, and a* 0.6 *per cent. NaCl solution.* 16 pigs of an average weight of 437.5 grammes were inoculated in both groins with a culture of tubercle bacilli of weak virulence (all but 3 pigs had gained weight at the end of two months).

April 23*d. We tested all on the sixty-third day.* The serum and the NaCl were given, undiluted, subcutaneously in a dose of 1 to 2 c.c.; tuberculin, diluted, was given $1\frac{1}{4}$ hours later, subcutaneously, in a dose

TABLE V.

No.	Days inoculated.	Weight.		Tuberc. 12 M.	0.6 per cent. NaCl solution.				Temperature.		Survived or died.	Autopsies.
		11/18,'97	Loss or gain.			Dose. 12 M.	Dose. 3 P.M.	Dose. 6 P.M.	12 M.	5.30 P.M.		
1	50	350gm.	—125gm.	0.350	Control	0	0	0	100°	Dying	6 hours	General tuberculosis; slight caseation; reaction.
2	50	475	— 75	0	"	0	0	0	102	104.4°	K. after 24 hours	General tuberculosis; slight caseation; tuberculin not given.
3	50	555	—115	0.555	NaCl	3.33 c.c.	3.30 c.c.	3.50 c.c.	104.2	100.2	15 hours	General tuberculosis; NaCl nearly all absorbed; reaction apparent.
4	50	565	— 55	0.566	"	3.39	3.29	3 50	103.2	101.2	11 hours	" " " "
5	44	430	— 40	0.430	"	2.50	2.50	2.50	103.2	105	Survived	" " " "
6	44	505	+ 70	0.505	Control	0	0	0	102.2	99.4	10½ hrs.	" " " "

TABLE VI. (A).

No.	Inoculation.	Test day.	Weight.		Serum, etc. January 29th.		Temperature. January 28th.		Temperature. January 29th.		Temp. variation.	Condition.	
			XI/5,'96	I/28,'97	Kind.	Dose.	11.30 A.M.	5.30 P.M.	11.30 A.M.	5.30 P.M.			
1	XI/5,'96	85th	395 gm.	510 gm.	Control	0	102.5°	101.6°	101°	101°	0	Fat	
2	"	"	285	340	Rabbit I	1.70 c.c.	102	102	99.2	102	+2.8°	Thin	
3	"	"	475	525	Ass R 2	2.62	102.5	101.2	102	101.4	+1.6	Fat	
4	"	"	445	540	NaCl	2.70	102	101.6	100.2	101.6	+1.4	"	
5	X/5,'96	116th	480	420	Ass R 2	2.10	102	101.4	101.2	102	+0.8	Poor	Died in 18 hours; was quite ill.
6	"	"	380	500	"	1.25	101.5	100.4	101.2	100.8	—0.4	Good	
7	"	"	.....	545	"	2.77	101	100.3	101	100.4	—0.6	"	
8	Not inoculated.		.....	470	"	2.00	.....	.....	101	101.2	+0.2	"	

of 0.300 c.c.; 6 pigs that received the serum of ass R, 2d, all died in from 7 to 11 hours; 3 pigs that received NaCl solution, all died in from 7 to 9 hours; of 7 controls, 2 survived and 5 died in from 9 to 12 hours.

Result. The serum infiltration was not completely absorbed; the NaCl solution was entirely so. The lesions were very uniform and showed chronic fibro-caseous lymph nodes; very large, slightly caseous spleen; beginning caseation in the liver; miliary tuberculosis of the lungs. The dose of tuberculin was rather larger than was necessary for most of the animals; no influence could be seen.

Serum of ass M. 3 pigs were taken 55 days after infection (*a*); 2 pigs, 6½ months after infection (*b*); tuberculin was given 40 minutes later than the serum. (*a*) 2 pigs received the serum of ass M in a dose of 1 and 2 c.c. subcutaneously, and tuberculin, 0.100 c.c.; 1 survived and 1 died in 10 hours; 1 control-pig injected subcutaneously with tuberculin, 0.100 c.c., died in 12 hours; (*b*) 1 pig received of the serum of ass M 2.5 c.c., and of tuberculin, 0.100 c.c.; it died in 10 hours; 1 control-pig received tuberculin, 0.100 c.c., and died in 12 hours. (See Table V.)

Result. There was no certain protection.

A 0.6 per cent. NaCl solution in repeated doses, with large doses of tuberculin. 6 pigs of an average weight of 480 grammes received 4 inoculations on December 30, 1896, and 2 inoculations on January 5, 1897, of a pure culture of tubercle bacilli of moderate virulence; NaCl solution was given in a dose of 0.006 to 1 gramme of pig, and tuberculin in a dose of 0.001 to 1 gramme of pig.

Result. The excessive doses of tuberculin and the prolongation of life in the animals that received the NaCl solution suggest that the influence of the latter may be due to a supporting effect on the failing hearts of the poisoned animals by adding bulk to the blood or diluting and promoting the excretion of the poison.

May 27, 1897. 0.6 per cent. NaCl *solution in a single dose.* 15 pigs of an average weight of 676.7 grammes were inoculated in the groin with a first culture of virulent tubercle bacilli; 4 died in from 5 to 34 days.

July 2, 1897. *We tested* 11 *on the thirty-sixth day.* The NaCl solution was given subcutaneously to six in a dose of 0.010 to 1 gramme of pig; the tuberculin, subcutaneously, in a dose of 0.150 to all, 15 minutes later; of the 6 pigs that received NaCl solution in doses of 4.75 to 7.30 c.c., 2 survived and 4 died in from 6 to 12 hours; of 5 controls that received tuberculin only, 3 survived and 2 died in from 6 to 12 hours.

Result. No protective influence of the NaCl can be seen in this experiment, though it seems apparent in some others. The lesions showed virulent infection, but not uniform caseation.

Effect of the serums on the temperature of tuberculous guinea-pigs (without tuberculin). Serum of ass R, second; serum of rabbit VIII; and solution of the NaCl, 0.6 per cent. Miscellaneous pigs, inoculated with non-virulent tubercle bacilli and having chronic disease, were used. (See Table VI.)

Result. There was apparently no influence on the temperature.

Test 3 *days later of the first four pigs* (Table VI., B) *with tuberculin.*

Ass R, second serum, was given in separate places at the same time, subcutaneously.

TABLE VI. (B).

No.	Serum.		Tuberc.	Temperature.		
	Kind.	Dose.	Dose.	A. M.	P. M.	Variation.
1 . . .	Ass R 2	2.15 c.c.	0.015 c.c.	101°	105°	+4°
2 . . .	0	0	0.010	101	104	+3
3 . . .	0	0	0.015	102.4	104.6	+2.2
4 . . .	Ass R 2	2.70	0.0155	101.6	102.4	+1.8

Result. There was no effect in preventing a rise of temperature.

January 20, 1897. *Effects of serum on the temperature when given with small doses of tuberculin.* 10 pigs were inoculated with bacilli of moderate virulence. (1 died of enteritis.)

They were tested on the twenty-second day. The serum of ass R, second, and NaCl, 0.6 per cent. solution, were given in doses of 0.004 to 1 gramme of pig, diluted one-half; tuberculin in a dose of 0.0005 to 100 grammes of pig; they were given in separate places at the same time, subcutaneously.

TABLE VII.

No.	Weight.			Serum, etc.		Tuberc.	Temperature.		
	I/20,'97	II/11,'97	Gain or loss.	Kind.	Dose.	Dose.	12 M.	6 P.M.	Variation
1	665 gm.	605 gm.	—60gm.	Ass R 2	2.40 c.c.	0.003 c.c.	102.2°	102.2°	0
2	400	395	— 5	"	1.58	0.0019	103.6	105	+1.4°
3	390	400	+ 5	"	1.60	0.002	108.8	104.4	+0.6
4	420	415	— 5	"	1.66	0	102	102.6	+0.6
5	375	345	—30	NaCl	1.48	0 0017	102	101.6	—0.4
6	390	440	+50	"	1.76	0.022	103	103.6	+0.6
7	445	450	+ 5	Control	0	0.022	102.2	104.6	+2.4
8	610	610	0	0	0	0.003	102	103.6	+1.6
9	920	875	—45	0	0	0.0043	103	104.8	+1.8
10	.....	.....	.....	.....	.....	.....	.....	.....	.....

Result. The controls seemed to have a greater rise of temperature, but the NaCl pigs seemed to have less rise than the serum animals, thus making a specific effect of the serum less likely.

January 20, 1897. *Serum of ass R, second bleeding, and of horse II.* 6 pigs of an average weight of 492.5 grammes were inoculated with a pure culture of tubercle bacilli.

The test was on the twenty-fourth day. Serum was given in doses of 0.006 to 1 gramme of pig; tuberculin in doses of 0.0005 to 100 grammes of pig; they were given simultaneously, in separate places under the skin.

TABLE VIII. (A).

No.	Weight.			Serum. Ass R 2	Tuberc.	Temperature.		
	I/20,'97	II/18,'97	Gain or loss.	Dose.	Dose.	12.30 P.M.	5.45 P.M.	Variation.
1	475 gm.	450 gm.	—25gm.	2.70 c.c.	0.0022 c c.	102.8°	104.6°	+1.8°
2	555	545	—10	3.27	0.0032	102.2	Died soon after dose (shock)	
3	430	415	—15	2.49	0.0024	102.8	104.4	+1.6
4	480	400	—80	Control	0.0024	103.8	105.2	+1.4
5	500	535	+35	"	0.0020	103.2	104.4	+1.2
6	515	505	—10	"	0.003	102.6	102.8	+0.2

Result. The serum did not prevent the temperature rise due to tuberculin.

The serum of horse II was tested on the forty-second day. Serum was given in a dose of 0.004 to 1 gramme of pig; tuberculin in equal volume was given subcutaneously 10 minutes after the serum.

TABLE VIII. (B).

No.	Weight.			Serum.		Tuberc.	Temperature.		
	I/20,'97	III/4,'97	Gain or loss.	Kind.	Dose.	Dose.	10.30 A.M.	5.45 P.M.	Variation
4	480 gm.	380 gm.	—100gm.	Horse II	1.10 c.c.	0.076 c.c.	102°	104.4°	+2.4°
3	430	420	—10	"	1.68	0.084	102.2	105	+2.8
6	515	520	+5	"	2.08	0.104	102.4	99	—3.4
1	475	435	—40	Control	0	0.097	101.8	103	+1.2
5	500	555	+55	"	0	0.111	102	105	+3

Result. There was no influence upon the effect of non-fatal, large doses of tuberculin.

January 5, 1897. *Serums of horse I and horse II.* 10 pigs were inoculated with a pure culture of tubercle bacilli of moderate virulence. (See Table IX.)

They were tested on the forty-ninth day. The serum and the tuberculin were given in separate places under the skin of the abdomen, simultaneously.

TABLE IX.

No.	Weight.			Serum.		Tuberc.	Temperature.		
	I / 5,'97	II / 23,'97	Gain or loss.	Kind.	Dose.	Dose.	12.30 PM	5.30 P.M.	Variation
1	440 gm.	280 gm.	—60gm.	Horse I	2.0 c.c.	0.002 c.c.	101.2°	105°	+3.8°
2	455	465	+10	"	1.5	"	102.4	105.4	+3
3	377	405	+28	"	1.5	"	103.2	104.4	+1.2
4	777	760	—17	Horse II	2.0	"	101.2	105.2	+4.0
5	360	410	+50	"	1.0	"	103	105.8	+2.8
6	760	630	—130	"	1.5	"	103.2	104.6	+1.4
7	407	465	+58	Control	0	"	102.2	104.8	+2.6
8	792	785	— 7	"	0	"	102.2	104.2	+2
9	490	470	—20	"	0	"	103	105.6	+2.6
10	685	690	+ 5	"	0	"	103	104.2	+1.2

Result. There was evidently no preventive effect on the temperature reaction.

March 27, 1897. *Effect of the serums of R and H on the local reaction after tuberculin injections into the eyes of rabbits* (see Part I.). Three weeks after discontinuance of treatment and 56 days after the inoculation of the eyes, the congestion of the acute stage in the disease was decreasing; some eyes had become caseous to a large extent. A small dose (0.010) of tuberculin was given to 5 of the animals (not mixed with serum); serum was given at the same time. 2 received 3 c.c. each of serum R; 2 received 3 c.c. each of serum H; 1 control received tuberculin only.

Result. There was slight additional redness in all, with a temperature of 104.5°, an increase of 2° to 2.5° after six hours. This was not less with the serum rabbits.

April 1, 1897. The test was repeated with three controls; the dose of tuberculin was 0.020.

Result. There was slight increase of congestion and temperature in all, without perceptible difference between the controls and the serum animals. There was no influence in preventing local reaction.

RÉSUMÉ. The results of our four years' work in experiments upon four sheep, three asses, twelve fowls, eighteen rabbits, and four hundred and fifty guinea-pigs are to be found in the following summary:

1. A sheep was injected intravenously with killed thymus cultures. The result was so unsatisfactory that the serum-tests were not conclusive.

2. Chickens were inoculated intraperitoneally with mammalian tuberculosis. The serum revealed no germicidal or inhibitive action on the tubercle bacilli, nor favorable influence on the course of the disease in guinea-pigs.

3. A sheep was injected with tuberculin. The serum was wanting in germicidal, antitoxic, or curative effect so far as tested.

4. A sheep was inoculated intravenously with non-virulent cultures. Cachexia followed, and the serum was therefore not used.

5. An ass was inoculated as in (4.); it died from pulmonary embolus. The serum was not bactericidal to tubercle bacilli.

6. An ass was inoculated with virulent tubercle bacilli and treated with tuberculin. The serum showed no germicidal nor curative, but possibly some antitoxic effect.

7. An ass was inoculated with non-virulent tubercle bacilli and treated with various extracts of tubercle bacilli and dead bacilli. The serum showed no activity.

8. Rabbits were inoculated with non-virulent and virulent tubercle bacilli, and recovered. Their serum possibly conferred some protection in tuberculin poisoning, and possibly prolonged the lives of treated guinea-pigs.

With a full appreciation of the uncertainty of correct conclusions from tests of the serums other than our own product which were tried with tuberculin, we may state that only one indicated antitoxic power. This was obtained from a horse inoculated with non-virulent cultures.

That the apparent protection against fatal tuberculin poisoning occasionally seen was not necessarily due to the specific antitoxic power of the serums is made probable by the similar effects of physiological salt solution seen at times.

None of the serums appeared to prevent local or general reaction from small doses of tuberculin, nor to influence the temperature of tuberculous animals.

Disappointing as these results may seem, the writers feel that, in the light of recent contributions made by Ehrlich, Wasserman and Behring[10] to our knowledge of the mechanism of immunity and antitoxin production in the body, the outlook for an efficient tuberculosis antitoxin is by no means a hopeless one.

In conclusion, we would express our thanks to Drs. S. W. Hewetson, W. S. Nelson, and J. A. Wilder, all of whom have aided in the many arduous details of these experiments.

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REVIEWS.

STUDIES ON THE PSYCHOLOGY OF SEX. Vol. I. "Sexual Inversion." By HAVELOCK ELLIS. London: The University Press, Watford, 1898.

As indicated by its title, this book follows a line of investigation somewhat similar to that pursued some years ago by Kraft-Ebing, and described by him in that extremely popular work, *Psychopathia Sexualis*. There is, however, a difference between Kraft-Ebing's book and the work now before us, in that the former treated of all the known vices or degeneracies, or whatever one may please to call them, while the latter deals with only one, viz., homosexuality. Another great difference which suggests itself consists in the fact that this book, written as it is by the leading criminologist of the day, is bound to command respect and attention; and, although following to a certain extent in the footsteps of Kraft-Ebing, has never been intended by the author for general distribution among the laity.

There will always be a question in the minds of the majority of the medical profession as to just how much good is accomplished by the writing of such books. That the author himself is fully aware of this feeling, and is keenly sensitive upon the subject, is evidenced by the preface to his work, occupying six pages, in which he vigorously defends his studies in this rather unsavory subject.

Again, in one of the concluding paragraphs, he makes the following statement:

"In dealing with it—*i. e.*, the subject of the work—I have sought to avoid that attitude of moral superiority which is so common in the literature of this subject. . . . Such an attitude is as much out of place in scientific investigation as it is in judicial investigation. The physician who feels nothing but disgust at the sight of disease is unlikely to bring either succor to his patients or instruction to his pupils."

While entirely agreeing with these statements, and recognizing both the scientific value of the work and the honesty of purpose of the author in writing it, we must at the same time point out the great necessity for keeping such a book within the bounds of the profession and of discountenancing its general circulation among the laity. In spite of the ingenuous plea which the author makes in his preface for a wider dissemination of knowledge of the sexual instinct, we cannot help but feel that the less young men and young women know of homosexuality the better. To us of the medical profession, however, the book will prove extremely interesting, and will, moreover, demand careful attention and thought.

The opening chapter is of the nature of an introduction, and deals with the general prevalence of sexual inversion. From the stand-point of evolution it is interesting, as pointing out the wide extent of homosexuality among animals.

Historically this chapter is of considerable interest as describing

the widespread prevalence of sexual inversion among all the races of the earth and among all sorts and conditions of men.

To some sensitive minds it may come like a shock to hear that David and Jonathan were sexual inverts, as were likewise Michael Angelo, James the First of England, Frederick the Great, Pope Sixtus VI., Walt Whitman, and Paul Verlaine.

Upon the whole, the first chapter is in every respect the most interesting of the volume.

Chapter II. is devoted to a short sketch of the men who have attained considerable reputation by their investigations into sexual perversions, including Casper, Ulrichs, Kraft-Ebing, and Schrenck-Notzing.

The third, fourth, and fifth chapters are devoted to narration of the histories of many cases of homosexuality, both male and female, no details that might prove of interest in these cases being omitted.

The theory of sexual inversion is discussed in the sixth chapter, and very instructive reading it makes. At the outset the author states that the sexual invert is regarded as a social outcast by his friends, as insane by the asylum superintendent, and as a criminal by the police.

Ellis believes that the truth lies in neither one of these three views. Nor does he believe the sexual invert to be necessarily a degenerate—a term, by the way, which Ellis declares "has simply become a term of literary and journalistic abuse." Sexual inversion, according to the author, is a congenital abnormality or predisposition. He states that probably many persons go through the world with this predisposition to sexual inversion latent and unaroused; in others it is aroused by the operation of some exciting cause, chief of which is seduction, "or the initiation of the boy or girl by some older and experienced person in whom the inversion is already developed."

The final chapter of the book deals with the methods to be employed to prevent homosexuality; and here the author offers a strong plea for the coeducation of the sexes, claiming that one of the exciting causes of sexual inversion is the general school system where boys and girls are separated. This is rather a novel argument in support of co-education, and one that the advocates of that measure would hardly call legitimate.

As regards the medical treatment of inversion, the author "strongly advocates discrimination, caution, and skepticism." He is earnestly opposed to the method of Schrenck-Notzing, which, in order to cure the vice of sexual inversion, advocates prostitution, considering such a remedy worse than the disease. As far as really curing these cases is concerned, the author expresses his views as follows:

"We can seldom, therefore, safely congratulate ourselves on the success of any 'cure' of inversion. The success is unlikely to be either permanent or complete in the case of a decided invert. I am inclined to say that if we can enable an invert to be healthy, self-restrained, and self-respecting, we have often done better than to convert him into the mere feeble simulacrum of a normal man."

Such conclusions, arrived at by such an eminent criminologist as Havelock Ellis, are, to say the least, discouraging, and are certainly calculated to cast considerable doubt in the minds of many upon the value of such investigation.

However, to those who are particularly interested in this great social

problem we earnestly recommend this work, feeling sure, with the author, that the knowledge here gained will equip them better to enter upon the wider questions of sex. H. M. C.

DIE STÖRUNGEN DES VERDAUUNGSAPPARATES ALS URSACHE UND FOLGE ANDERER ERKRANKUNGEN. Für practische Aertze. Von DR. HANS HERZ. Pp. 543. Berlin: S. Karger.

THE DISTURBANCES OF THE DIGESTIVE APPARATUS AS CAUSES AND RESULTS OF OTHER DISEASES. By DR. HANS HERZ.

THE NATURAL HISTORY OF DIGESTION. The Contemporary Science Series. By A. LOCKHART GILLESPIE, M.D., F.R.C.P. Ed., F.R.S. Ed. Illustrated by Figures, Diagrams, and Charts. Pp. 427. London: Walter Scott, Ltd., 1898.

THE study of diseases of the digestive organs has in recent years brought so many new facts to light and has given us such comparative security in diagnosis and treatment, that when our present knowledge is contrasted with what was known but a few years ago, our chief feeling must be one of gratitude for all the productive special work upon this line. But with this feeling there remains a conviction that the methods of examination now adopted in investigating the diseases of this system have acquired too great multiplicity and elaborateness, and that in emphasizing the necessity for complicated and difficult chemical examination of gastric contents and physical examination of the patient, with expensive apparatus or awkward methods, many writers upon this subject discourage practitioners with little special training from any attempts to carry out the simple investigations that are, after all, the most trustworthy and most important. And owing to the interest that now attends the use of these modern methods of determining the local changes that take place in gastro-intestinal affections, such local changes are treated with a comprehensiveness that is in itself entirely laudable, but that causes more general questions to suffer. It seems safe to hazard the casual statement that in the majority of recent works upon diseases of the stomach in especial, the discussion of the methods of determining the existence of local variations from the normal are accorded more space than is the consideration of the effect of diseases of this organ upon other systems and organs. The inevitable result is that the general reader is led into false conceptions, and the important but not absolutely essential matters stand forth with a prominence that obscures the vital relations existing between the digestive system and the general economy. Such statements are, most assuredly, not true of all authoritative recent works, but they are so nearly true of a large percentage that this work of Dr. Herz comes at an opportune time, and must receive a warm welcome. The criticism that first occurs to one is the contrary of that which has just been passed upon special works on gastric diseases. Far from being too narrow, the scope of the work is almost too broad for a volume of this size, and the requisite brevity in discussing the variety of questions that present themselves leaves some

of these insufficiently elaborated. The book is, however, such a storehouse of facts, commonplace, curious, rare, and interesting, all combined, that the necessary brevity may be excused in the pleasure that comes from reading it. The relations that the diseases of the organs concerned in digestion bear to the etiology and course of other diseases are discussed in a systematic consideration of diseases of the blood, infectious diseases, and the diseases of the various systems of organs, and, following the treatment of each of these questions, the tables are turned and each of the series is discussed in its relation to the production and perpetuation of digestive disorders.

Throughout the work its scope is even further enlarged and the interest heightened by numerous critical comments upon theories of the causation and nature of various diseases, whether these theories relate to the digestive organs or not, and the author exhibits gratifying calmness of judgment with a healthful skepticism that is inspiring. In a few instances these qualities desert him. One can scarcely admit with him that the theory of the production of certain forms of jaundice by paracholia, or altered direction of cellular secretion, is acceptable because no other theory is; and when Dr. Herz would throw discredit upon the typhoid bacillus as the constant cause of typhoid fever we suspect him of some violence in his iconoclasm. But such examples are uncommon. The book abounds in clear judgments and valuable ideas, and the style is lucid and frequently interspersed with bits of fantastic but penetrating cynicism that render the author's style both convincing and attractive. The chapters on the diseases of the blood, infectious diseases, and diseases of the nervous system are especially commendable in the contrast they offer to the limited discussion commonly accorded them in works devoted to the consideration of the diseases of the digestive tract.

Dr. Gillespie's work also is one that has been greatly needed. No comprehensive collation of this kind exists in recent English literature, and while the developments that have been secured in the study of the more abstract questions relating to digestion have been important, the papers containing them have been so scattered that none but specially interested readers have had opportunity to make themselves familiar with existing views. Dr. Gillespie first presents briefly the ancient theories of the nature of digestion, following this by interesting chapters upon digestive processes in plants, all of which is introductory to the more important consideration of digestion in animals. The structure of the alimentary tract, the probable nature of ferments and the character of their action, and the chemical composition of food-stuffs are discussed briefly before entering upon the description of digestion as it occurs within the body. The following pages contain concise, clear, and well-arranged statements of the action of saliva upon starch, the composition of saliva, the rapidity of its action, and the effect upon its action of varying amounts of hydrochloric acid; the source of hydrochloric acid, the effects of different forms of foods upon its secretion, the digestion of proteids by gastric juice, the effects of different acids as compared with hydrochloric acid, and many related questions left untouched by more purely practical treatises are discussed in a very interesting manner. The description of the actions of pancreatic secretion, bile, and the intestinal secretions follows, and is succeeded by a

consideration of the action of the bacteria of the intestines, the process of absorption, and the mechanism of secretion. The nature of the senses of taste, smell, hunger, and thirst are discussed—so far as these questions are at present subject to intelligent discussion. Metabolism is then treated of at sufficient length to give the reader a clear conception of what is known concerning this difficult physiological problem, and the book closes with an extended consideration of diet and foods, describing the physiological essentials of a diet, and then discussing the food elements and many of the more important individual foods in relation to their digestibility and their calorifacient value.

In certain portions the style of the book is rather too technical to be entirely clear, unless the reader understands chemistry fairly well. With this exception, however, there is little to criticise. All the important work that has appeared within the past few years is discussed so far as the limits of the book allow of discussion, and extremely little of value has been omitted. Indeed, the author has compressed so much into a small space that the book is exceedingly valuable for reference concerning questions that are often difficult to settle because of the desultory manner in which authoritative discussion of them has appeared; and it is especially important as a source from which the general medical reader may, without an impossible amount of research and expenditure of time, make himself familiar with the physiology of digestion as this question is now viewed. Not least interesting are the accounts of the author's own original work. The results of part of this have been published previously in separate papers, but both these and the portions that reach the reading public for the first time are valuable and interesting. D. L. E.

MANUAL OF PATHOLOGY, INCLUDING BACTERIOLOGY, THE TECHNIC OF POST-MORTEMS, AND METHODS OF PATHOLOGICAL RESEARCH. By W. M. LATE COPLIN, M.D., Professor of Pathology and Bacteriology, Jefferson Medical College; Pathologist to Jefferson Medical College Hospital and to the Philadelphia Blockley Hospital; Bacteriologist to the Pennsylvania State Board of Health; being a second edition of the author's Lectures on Pathology, Rewritten and Enlarged, with 268 illustrations, many of which are original. Pp. 638. Philadelphia: P. Blakiston, Son & Co., 1897.

IN the preface it is stated that the lectures of the author of this book were published in serial form, the parts being afterward bound and placed on the market. Within a short time this edition was exhausted; the book was then revised and published in the form of the present volume, the larger part having been rewritten. The first edition contained 250 pages and 51 illustrations; the present volume has reached 638 pages and contains 268 illustrations. The most difficult problem for the author has been to keep the volume from reaching undesirable dimensions.

The volume is presented, not as a treatise or book of reference, but, as the title indicates, as a manual which might prove useful in the laboratory, the post-mortem room, and in clinical microscopic diagnosis. To attain the last aim the chapters on Microscopic Examination of Tissue,

Blood, and Urine have been fully illustrated. Such is the *raison d'être* and the aim of this recent American work on pathology. Inasmuch as American text-books of pathology are rather rare publications, it will be interesting indeed to observe how the author of the present volume has accomplished his task.

Part I. deals with technical matters; the technique of post-mortem examination occupying forty pages. The illustrations of this part are borrowed from Virchow; in the cut illustrating the preliminary opening of the right ventricle the author has added an incision which, he says, is preferred to the one advised by Virchow, because the papillary muscle attached to the anterior ventricular wall will then be carried over with the ventricular wall, the auriculo-ventricular orifice being thereby better exposed. Virchow's original incision, however, is probably the preferable one, because if the papillary muscle attached to the anterior ventricular wall is cut, then the tricuspid orifice becomes much larger than it really is, as any one can demonstrate to his own satisfaction.

The histological methods are next considered. Many of the illustrations of instruments are, it would seem, superfluous.

The recommendation that pieces of tissue be soaked in different paraffins for forty-eight hours certainly provides for an abundance of time, and the sweeping condemnation of the freezing methods is altogether too emphatic.

The chapters on the Examination of the Urine and of the Blood seem to be as satisfactory as could be expected under the circumstances. Widal's serum-test for typhoid fever is carefully described.

Part II. is devoted to General Pathology, including Bacteriology. It occupies 272 pages. The definitions of hypertrophy and of atrophy are rather peculiar; hypertrophy is defined as "increased functional power, which has a tendency to persist," while atrophy, being the reverse of hypertrophy, is "diminished functional power." The cellular changes which underlie these conditions merit more prominence, because the terms are essentially anatomical in their significance. In the few paragraphs devoted to atrophy it is stated that an atrophic organ is not merely one that is diminished in size or weight, because in the condition known as red atrophy of the liver the organ may be much increased in size; but the student is not told anywhere in the pages of this book what red atrophy of the liver is.

The descriptions of the regeneration of nerves and of bones are rather vague. After reading them over carefully one cannot say that he has obtained a distinct idea as to the chain of events in the regeneration of these structures.

In the section on tumors, page 210, it is stated that glioma occurs in the neuroglia or connective tissue of nerve, and is a form of round-cell sarcoma. In view of the now well-known and generally taught ectodermal origin of neuroglia, this paragraph should be modified.

The remaining pages are devoted to a consideration of the special pathological anatomy of the blood, the serous membranes, the heart and the bloodvessels, the mucous membranes, the respiratory tract, the digestive organs, the spleen and the lymph-glands, and the urinary organs.

The pathological anatomy of the skin, the genital organs, the ductless glands, the bones and joints, and of the nervous system, is not considered at all. This incompleteness detracts most seriously from the possible usefulness of a book put forth as a guide in laboratory and post-mortem

work, and it would have been only fair to prospective purchasers if the limited scope of the work had been indicated on the title-page.

A separate consideration of fifteen and seventeen pages is given to the serous and mucous membranes respectively; this could well have been omitted, because the essential facts are stated also in connection with the various systems of organs. Figs. 236 and 237 are reproductions of Figs. 95 and 96; both sets illustrate anthracosis and chalicosis of the lungs, and remarks concerning these processes under the pathological anatomy of mucous membranes are repetitions of those made under general pathology. There is, therefore, room for condensation.

There are many statements in the chapters on Pathological Anatomy that are open to criticism. On page 412 it is stated that in hyaline degeneration of the myocardium the fibres may undergo segmentation and fragmentation, but it is not emphasized that dissociation often occurs independently of hyaline changes. In discussing arterio-sclerosis, or atheromatous arteritis, as the process is termed in this book, no mention is made of Thoma's generally recognized theory as to the pathogenesis of this important disease.

On page 472 occurs the following incomplete statement: "Although rare syphilitic and tubercular ulcers may be side by side, and differentiation of the gross lesion impossible, the finding of anatomic tubercles containing the bacillus affords the necessary evidence." Thrombosis in the pulmonary artery is referred to as "autochtonous embolism" (page 455).

On page 508 it is erroneously stated that the tubercle bacillus, no matter the route of invasion, always incites a broncho-pneumonia. The description of the anatomical forms of pulmonary tuberculosis is rather meagre.

In various places fibrinous exudate is referred to as plastic; this designation dates from the time when a species of spontaneous generation was regarded as possible in the "plastic material" exuded, and should, therefore, no longer be used with reference to fibrinous exudation.

On page 522 we read: "Unlike cancers, sarcomata, if situated in the distributions of the portal vein, rarely reach the lung, but, travelling by the bloodvessels, involve the liver."

On page 584 it is stated that sarcoma of the liver may be primary or secondary; that "the primary growths are exceedingly liable to be pigmented—melanotic." Now, the facts are, as is well known, that the liver is a favorite seat for the development of secondary melanosarcoma, while the occurrence of true primary melanosarcoma of the liver is exceedingly rare, if, indeed, it can be said that an authentic case exists.

In the remarks about suppurative nephritis there is no clear-cut distinction made between the embolic and ascending routes of infection. Exception may be made to the statement that cystic disease of the kidney (*sensu strictu*) in the adult is usually unilateral. The tumors of the kidney receive very little mention.

The language is sometimes involved and ambiguous. On page 594, when speaking of "medical" and "surgical" diseases of the kidney and their relation to the cortex and medulla respectively, the author says "the division is purely clinical, but has some foundation in that the lesions which actually manifest themselves are, to a certain extent at least, in the structures just indicated." On page 460 we read of the

"bacteritic" factor. On page 578 it reads: "The pus of the amœbic abscess may be sterile and contain the amœba coli." On page 537 occurs the following statement: "Suppuration of the lymph-glands fails to occur in many infections, particularly in those in which the infecting organism does not possess the faculty of pus production." Again, on page 611 it says: "As a rule, but one kidney is involved, except in bilateral congenital cystic disease, when both organs may be implicated."

At the end of each chapter is a list of questions for the guidance of students; sometimes the questions are rather comprehensive, as, for instance (page 524), "What morbid conditions may be found in the lung?"

The original drawings are very good, as a rule. In Fig. 178 of actinomycosis the organism is explained as coming from bovine tuberculosis. In Figs. 198 and 199 of leprosy and syphilis-bacilli the bacilli are drawn as though from cover-slip preparations. The majority of the borrowed drawings are rather diagrammatic. The indices are quite complete.

L. H.

EPIDEMIC DIPHTHERIA, A RESEARCH ON THE ORIGIN AND SPREAD OF THE DISEASE FROM AN INTERNATIONAL STAND-POINT. By ARTHUR NEWSHOLME, M.D. Pp. 192. London: Swan Sonnenschein & Co., Limited, 1898.

DR. NEWSHOLME'S work is the result of a most careful and laborious study of the epidemics of diphtheria that have occurred in various cities and countries, and of the coincident, preceding, and succeeding climatic conditions that have been recorded. In handling statistics of the disease he has recognized such limitations of their value as are due to defects of registration, differences in nomenclature, and the fact that deaths alone cannot be an absolute index of prevalence; but with the material at hand he has worked with great care, conscientiousness, and skill. He dissents from the generally-accepted view that the origin and spread of diphtheria are favored by wet weather, and, in fact, shows that the great pandemics have all occurred during periods of unusual dryness, and draws attention to the fact that in tropical countries, where the conditions of excesive humidity and rainfall obtain, it is a rare disease. His main conclusions are two: 1. That diphtheria spreads from town to town and from country to country, the means of spread being almost certainly personal infection. 2. That certain climatic conditions are necessary for the development of diphtheria as an epidemic, and still more for its development on a pandemic scale. His observations on the relation between rainfall and ground-water and the rise of epidemic diphtheria lead him to the conviction that epidemics never originate after a series of years in which each year's rainfall is above the average amount, or in a wet year unless this follows after two or more immediately preceding dry years; that all epidemics of which accurate data are available have originated in dry years, and that the most extensive of them have occurred when there have been four or five consecutive dry years. In discussing the various phases his arguments are well sustained by numerous diagrams and tables, the collection and preparation of which must have entailed the expenditure of much time and trouble.

In view of the impossibility of controlling meteorological conditions, he lays especial stress on the importance of preventing personal infection during epidemic periods, and of improving the wholesomeness of the soil in districts in which the disease is endemic. C. H.

ATLAS OF LEGAL MEDICINE. By DR. E. VON HOFMANN. Authorized Translation from the German. Edited by FREDERICK PETERSON, M.D., assisted by ALOYSIUS O. J. KELLY, M.D. Philadelphia: W. B. Saunders, 1898.

THIS is a series of fifty-six colored plates and nearly two hundred illustrations in black, all original and prepared from recent cases or museum specimens, designed not to serve the purpose of a text-book of legal medicine, but as an assistance or supplement to such a work. The subjects cover such a wide range that it may be fairly stated that the entire field of medical jurisprudence is included. The colored plates are sometimes rather vivid, but always horribly realistic and, as specimens of color-printing, unsurpassed. As to the illustrations in black, which are reproductions from photographs, nothing could be finer, the minutest details being sharply brought out. Each illustration is accompanied by a description, and in many cases by discussion and inferences. The book is of particular value to medical examiners and coroners.

C. H.

TEXT-BOOK OF DISEASES OF THE KIDNEYS AND GENITO-URINARY ORGANS. By PROF. DR. PAUL FÜRBRINGER. Translated from the German, with annotations, by W. H. GILBERT, M.D. In two volumes. Vol. II. London: H. K. Lewis, 1898.

TEXT-BOOKS and treatises devoted entirely to special genito-urinary surgery are far from uncommon at the present day. Indeed, genito-urinary surgery, as a special branch of general surgery, has taken such rapid strides in the past few years that the general surgeon and books on general surgery are no longer competent to deal as fully with the subject as its importance demands. The book now in our hands is, according to the title-page, the second volume of a work devoted to diseases of the kidneys and genito-urinary diseases, and deals especially with surgical conditions of the kidney and bladder, gonorrhœa, and functional genito-urinary ailments.

The name of the author is one familiar to all genito-urinary surgeons, and is sufficient of itself to command widespread attention to the work.

The text is closely written, and in some places the sentences are so long and involved that the meaning is consequently somewhat obscure. This is, in all probability, due to faulty translation, although, upon the whole, with these few exceptions, the translator's work has been admirably accomplished.

The first part of the book, fully one-third of the whole volume, is devoted to diseases of the kidney and ureters. As might be expected, in the discussion upon this subject pathological anatomy forms the

most prominent feature; much more so, in fact, than in many a more pretentious work upon genito-urinary diseases. The whole subject of the surgical diseases of the kidney is treated very thoroughly, and is a most valuable contribution to the literature of this hitherto rather obscure field of surgical knowledge.

The article upon cystitis is, to our mind, the most unsatisfactory in the book, the reader finding himself at once involved in a hopeless tangle of varieties and classifications of cystitis, together with a most complex pathological anatomy of the various forms of the disease enumerated. We are pleased to note, however, the warning which the author, in discussing the treatment of this affection, sounds against reckless and indiscriminate irrigation of the bladder in cases of chronic cystitis.

In the section upon gonorrhœa in the male, which, by the way, is the ablest in the book, we are surprised to find that the author declines to admit of the division of urethritis into anterior and posterior. This localization of gonorrhœa is, to our mind, the most important factor in the successful treatment of the disease, and we certainly fail to find any sufficient argument advanced by the author for his refusal to accept this division of the urethra.

In discussing the treatment of gonorrhœa the statement is made that "the gonococcal theory has no influence on the therapeutic results obtained in gonorrhœa," a statement with which, we think, most genito-urinary surgeons with an extensive experience in the treatment of the disease will be heartily in accord.

The final sections of the volume are devoted to functional genito-urinary ailments, including impotence and sterility.

The work, as a whole, deserves careful study at the hands of genito-urinary surgeons, to whom it will prove to be of considerable value. Several new lines of thought are suggested which, to the specialist, should possess some interest. H. M. C.

THE PURIFICATION OF PUBLIC WATER-SUPPLIES. By JOHN W. HILL. Pp. 304. New York: D. Van Nostrand Company, 1898.

THIS work, according to the preface, is intended to present: 1. The fact and causes of pollution of sources of public water-supply. 2. The effect of this pollution on the typhoid-fever rates of our larger cities. 3. To illustrate, by a few examples, how typhoid death-rates have been reduced by the introduction of water from purer natural sources and by filtration of polluted waters.

The author demonstrates a thorough comprehension of the vast importance of his subject, and presents his case with unusual ability. Every subject connected with public water-supplies is fully and freely discussed. He has collected and condensed within reasonable limits a very large amount of material of the greatest value to sanitarians, water analysts, and officials intrusted with the responsibilities of the conservation of the public health, and his book deserves the widest circulation not alone among these, but also among the intelligent laity. C. H.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Œsophageal Stenosis Following Scarlet Fever and Diphtheria.—FRANZ EHRLICH (*Berliner klin. Wochen.*, October 17, 1898, S. 927) reports a case of stricture of the œsophagus, with an attack of scarlet fever and diphtheria as the only attributable cause.

A five-year-old boy had had scarlet fever and diphtheria, with severe ulceration in the throat, when three years old. There was no other history to account for the subsequent stenosis of the œsophagus. No history of syphilis or of swallowing caustic substances existed. The first trouble in swallowing came on shortly after the attack of scarlet fever and diphtheria, and progressed until all attempts to swallow solid food were followed by almost immediate vomiting. The child had become much emaciated. The passage of a sound revealed an impassable stricture between eighteen and twenty centimetres from the incisor teeth. As sounds could not be passed through the mouth, and as the age of the child rendered the use of the œsophagoscope inadvisable, gastrototomy was performed, and retrograde dilatation was attempted, but was only partially successful. The œsophagoscope was then introduced through the stomach, and a tight constriction was seen. An attempt was made to dilate the stenosis by having the child swallow silver balls after König's method, but without success. Then a spiral sound was introduced, causing some dilatation, and an attempt was made to introduce a permanent tube through the stenosis, but this could not be done, and after a few larger sounds had been passed a laminaria tent was introduced. This seemed in part successful, and a larger one was introduced, but in attempting to pull it out the thread broke. Attempts to drive the tent out by olive bougies were not successful, and it was finally dislodged by introducing a stiff bougie through the œsophagoscope, and was passed by

the anus a few days later. Water-pressure was afterward used, and increased the diameter of the stricture to a slight degree. Subsequent introduction of sounds brought the diameter up to twelve millimetres—nearly the same as the normal part of the œsophagus. The gastric fistula was closed, and the general condition of the boy when the case was reported was extremely good.

Eiselberg has also recently reported a similar case. The two cases appear to be unique in their etiology.

Clinical Examinations of the Blood-platelets.—Determann (*Deutsche Archiv für klinische Medicin*, 1898, Band lxi., Heft 4, S. 365) has made a careful study of the blood-platelets, with special reference to the origin of these interesting bodies. The value of his article is increased by a very complete bibliography on the subject.

The physical and morphological characteristics of the platelets in ordinary fresh specimens of blood, in specimens diluted with some preserving fluid, and in stained preparations are first described. Determann regards Bizzozero's fluid, consisting of a 0.9 per cent. solution of sodium chloride, to which concentrated aqueous solution of methyl-violet in the proportion of one drop of the latter to 10 c.c. of the former is added, the most satisfactory preserving fluid for studying and counting the platelets in the fresh blood.

The author's device for determining the number of platelets is an interesting and apparently satisfactory one. To prevent the natural tendency of the platelets to run together, the finger is pricked, a drop of the preserving fluid placed on the incision, and the blood allowed to flow directly into it. A cover-glass of a Thoma-Zeiss counter is then touched to a drop of diluted blood and the two intimately mixed on the cover. The cover-glass, with the proper-sized drop of diluted blood, is then placed in position on a Thoma-Zeiss counting-cell and the platelets and red blood-corpuscles counted over a certain area. In this way the ratio of platelets to reds is readily determined, and, knowing the number of red cells from a separate count, the number of platelets per cubic millimetre can easily be reckoned.

Determann has made counts in 110 individuals, of whom 25 were healthy persons. In the healthy individuals the ratio of platelets to red corpuscles ranged between 1 : 18 and 1 : 30, with an average of 1 : 22. He refers to the variations to which the number of platelets is subject in healthy individuals, and then deals at considerable length with the number of platelets as found in various diseases. In some chronic diseases the platelets are enormously increased, the proportion to reds often reaching as high as 1 : 1. In two cases, one of arthritis deformans and the other of myelitis, the platelets far exceeded the reds in number, the ratio being 2 : 1 and 4 : 1, respectively.

The various views concerning the origin of the platelets are then discussed, and from his own personal work he is led to support Arnold's observations that the platelets are derived from the red blood-corpuscles. For the purpose of studying the red cells and watching changes in them, under circumstances which varied as little as possible from their physical surroundings in the circulating blood, Determann employed small glass tubes, the ends

of which were drawn out to fine points and sealed. To fill the glass tubes, one fine end is placed in the flowing drop of blood and the tip broken off with small scissors. The blood then flows into what is practically a vacuum. When the desired amount is obtained this end is again sealed by heating, and the blood subsequently obtained from the other end as desired. Several tubes thus prepared are kept in a thermostat at 37° C. and examined microscopically after twenty-four hours or after several days or weeks. The specimens for microscopic examination are made according to Arnold's method, by impregnating very thin sections of elder-pith with the blood, applying a cover-slip, and then sealing the specimen with vaseline. In this way the air is excluded, drying is prevented, and the specimen can be studied for a long time.

In preparations thus made Determann finds that after twenty-four hours the red blood-corpuscles show definite buds on their surface, which at first are attached to the cell by protoplasmic processes and contain hæmoglobin. Later, the buds become separated from the cell, lose their hæmoglobin, and become indistinguishable from the ordinary blood-platelets. In preparations of normal blood examined after forty-eight hours, seventy-two hours, and longer, these changes were more marked, and the separated, decolorized, granular portions more numerous.

The blood in many cases of anæmia, including chlorosis, was examined in a similar way, and the budding process was much more marked than in normal blood.

Determann, as a result of his observations, is forced to agree with the view of Arnold, that the blood-platelets are, for the most part, not preformed elements, but derivatives of the red blood-corpuscles. He believes that the number of platelets in the blood is an index of the power of resistance of the red blood-cells at any particular time. He also thinks that the platelets are of prognostic importance in that they are an expression of the vitality of the red blood-corpuscles.

Tabes Dorsalis and Syphilis.—Guttmann (*Ztschr. f. klin. Med.*, Band xxxv., S. 242) refers at considerable length to the conflicting views held regarding the part played by syphilis in the etiology of tabes dorsalis. Erb and his followers, as is well known, hold that syphilis is an extremely important factor in its causation. On the other hand, Leyden and his school think that the part played by lues in the etiology is very much exaggerated. Both of these clinicians reiterated their widely different views at the Twelfth International Congress, held in Moscow in 1897. Leyden claims that the luetic theory is based upon an incorrect manipulation of the statistics.

Guttmann's work is published from Leyden's clinic, and naturally supports Leyden's theory, that lues plays an unimportant rôle in the etiology of tabes. The statistics include cases occurring in all spheres of life and in both sexes, females not being excluded, as has been the case in statistics supporting Erb's theory. He first reports 111 cases, all of which occurred either in Leyden's clinic or in the private practices of Prof. Leyden and Dr. Paul Jacob. In these 111 cases a syphilitic history was definitely present in 36, absent in 69, and doubtful in 6. Dividing the doubtful cases equally between the cases of tabes with and without a history of lues,

his statistics show 39 cases, or 35.1 per cent., with lues, and 72 cases, or 64.9 per cent., without lues.

In addition, Guttmann has statistics, from one of the most reliable insurance companies, of 25 cases in which tabes had been the cause of death. In not a single instance was a syphilitic history obtained when the patients secured their policies. Guttmann thus has a total of 136 cases of tabes, in 39 of which, or 28.6 per cent., syphilis existed, whereas in 97 cases, or 71.4 per cent., no luetic history was obtained. Guttmann proceeds to show that the researches in the anatomy and pathology of the disease are just as conclusive against the syphilitic theory.

Senator, on the whole, agrees with the Leyden school, but thinks that syphilis may be a predisposing factor in the causation of tabes just as it is in scrofula, rickets, amyloid degeneration, and contracted kidney.

Leyden and Senator claim that an anti-syphilitic method of treatment does not give better results than many other procedures, and that it often even does harm. The Leyden school recommends highly the hygienic-dietetic treatment as being the best. Systematic massage, friction, electricity, and baths, with suitable diet, afford the best results. It is claimed that the ataxia can be appreciably diminished by the proper carrying out of "compensatory exercises."

Diplococcus Peritonitis in Children.—HAGENBACH-BURCKHARDT (*Correspondenz-blatt für Schweizer Aerzte*, October 1, 1898, xxviii. Jahrg.) reports two cases of primary peritonitis in children due to the pneumococcus.

He refers to the work of Boulay and Bruns, who produced peritonitis experimentally on guinea-pigs by injecting Fraenkel's pneumococcus into the peritoneal cavity. In all animals experimented upon the pneumococcus was obtained in cultures from the peritoneal exudate, spleen, and heart's blood.

Comby states that pneumococcus peritonitis in children may be secondary to pneumonia or to a localization of the pneumococcus elsewhere. On the other hand, the pneumococcus may excite a primary peritonitis. The onset is sudden, with abdominal pain, vomiting, and fever. The disease runs a course similar to that of pneumonia, the symptoms subsiding after they have persisted for about eight days. The child at first seems to have completely recovered, but it is observed that the abdomen remains swollen, and eventually a purulent exudate is discovered. According to Comby, these cases heal spontaneously by perforation, either at the umbilicus or into the bladder. He has collected twenty-two cases in children, whose ages ranged between three and twelve years.

Bruns states that the disease is commoner in female than in male children, eleven of his fourteen cases being in girls. He refers to the probability of infection occurring through the generative tract. This view is supported by the frequency with which the infection is localized in the pelvis or iliac fossa. Of the cases collected by Bruns, eleven recovered and three terminated fatally. Laparotomy was performed in ten cases.

Hagenbach-Burckhardt's two cases were also in girls, aged two and six years respectively. The onset in both cases was sudden and acute, with abdominal pain, tenderness, and distention, fever and general disturbance of the health. There had been no previous lung involvement. The cases were

then believed to be either typhlitis or tuberculous peritonitis; the true nature of the disease being revealed by the cultures taken at the time of operation. The bacteriological examination showed that the disease was due to the pneumococcus. In one of the cases several metastatic abscesses developed in various parts of the body, the cultures from these showing the pneumococcus. In both patients the exudate was encysted and localized in the lower and anterior abdominal region. Both children made good recoveries after operation. Hagenbach-Burckhardt states that these cases do well after operation, and that a favorable prognosis may be given when cultures show pneumococci in a peritoneal exudate.

Typhoid Orchitis.—In the *Lancet* (October 29, 1898, p. 1048) reference is made to an instance of this rare complication, reported in the *Journal des Praticiens* for September 3d, by DR. BRETON. During convalescence from typhoid fever a youth, aged seventeen years, was seized with pain in the right testicle, which was soon followed by suppuration. When seen two months later there was an ulceration of the skin of the scrotum of the size of a franc-piece and a small fistulous opening surrounded by a reddened zone, the whole having the appearance of a tuberculous lesion. The testicle was involved, but the epididymis was not invaded. There was swelling of the lymph glands in the corresponding groin. Tuberculin injection gave no reaction. The whole of the suppurating area was removed; a bacteriological examination showed the presence of a bacillus with the characters of the typhoid bacillus, but the writer was not able to differentiate it absolutely from the colon bacillus. The wound healed in eight days.

[Orchitis appears to be an exceedingly rare event in typhoid fever. The first instance in between 800 and 900 cases at the Johns Hopkins Hospital occurred last summer. Dr. Davis, of the Military Hospital at Fort Meyer, Va., informs me that there have been three cases of orchitis among the 1100 to 1200 cases of typhoid fever treated there this year.—W. O.]

SURGERY.

UNDER THE CHARGE OF

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Two Cases of Oophorectomy for Inoperable Breast Cancer.—CHEYNE (*British Medical Journal*, May 7, 1898) reports two cases in which he removed the tubes and ovaries in accord with Beaston's method of treatment of inoperable cancer of the breast.

In one case he could not say that there was the slightest beneficial result from the oöphorectomy. In the other case, however, the operation had undoubtedly a marked effect on the growth of the cancer and led to very distinct breaking down or absorption of portions of the growth. The interesting point, however, is that the effect of the oöphorectomy gradually passed off, so that at the end of about six months the tumor began to grow again, and has since made marked strides. The result of these two cases, which were typical instances in young women whose ovaries were still active, and in which, therefore, their removal, if it is ever advantageous, should have produced the most marked results, is extremely discouraging, and he doubts if it is worth while going on with the procedure. Nevertheless, as a scientific fact it is clear, especially taken in conjunction with Dr. Beaston's first case and one reported by Mr. Boyd, that there is a distinct connection not only between the normal epithelium of the breasts and the ovaries, but also between cancerous epithelium of the breasts and the ovaries. But, unfortunately, in all the cases it appears that the effect of the removal of the ovarian influence is only more or less transitory at best, while in many cases no effect is produced.

If the operation were to be performed again, he thinks it would be well, either at the same time or, possibly better, later to remove as much of the noticeable disease as possible. This has already been suggested, and in one case the ovaries, breast, and glands were removed at the same time; sufficient time has not elapsed in this case for the operator to form an opinion of the result. If the result of removal of the ovarian influence is to lead to atrophy of the epithelium originating from the mamma, it would clearly be of advantage to have as little of the epithelium present as possible.

It is quite probable that if too much epithelium is present, the removal of the ovarian influence might not produce sufficient alteration in the body to overcome all disease.

A Case of Plastic Operation for Burns.—MACLAREN (*British Medical Journal*, June 4, 1898) reports an unusually interesting case in which the granulating surface, after the removal of the sloughs, extended round the whole right arm and forearm from the middle of the deltoid to near the wrist; it involved the right side of the chest from the axillary line above to the margin of the ribs below, and from within three inches of the sternum in front to the same distance from the spine behind; the entire axilla was denuded and raw. The whole thickness of the skin appeared to have been destroyed over a considerable part of this area; the burning was greatest in the neighborhood of the elbow-joint, and the tip of the olecranon was slightly bared.

The advisability of amputation to relieve the child's system from so great a drain from so large a suppurating surface was considered, but it was decided to make the attempt to save the arm. To diminish the granulating area and promote healing, the arm was bound to the side. Quick adhesion occurred, binding the arm to the thorax, thus diminishing the raw surface by a third.

In nine months complete healing had occurred. Two skin-flaps were then dissected from the thorax, one before and one behind, where the skin was

uninjured. They were left attached at both ends, and separated from the tissues underneath with glass slides for a fortnight. The arm was then separated from the side right up to the axilla; each flap was cut across at the end farthest from the axilla; a bed was made for each in the armpit; they were turned and sutured together, so as to form a broad tape of healthy skin at the fold of the axilla. The arm had been so cut from the side that the flaps united around it and covered the denuded area. The raw surface produced on the trunk was covered by making incisions in the sound tissues about the cicatrix, which permitted it to be run nearly together. Two months sufficed to complete the healing, except at the elbow. An inch and a half of the humerus was removed subperiosteally at the junction of the middle and lower thirds to relieve the tension on the hide-bound tissues due to growth and to save removing so much bone when the elbow-joint was excised, which was the next step.

The result was that the movements of the shoulder-joint were nearly normal. The elbow admits of almost complete flexion and extension; rotation of the forearm exists only to a very slight degree; the wrist has always been normal; the arm, of course, has not much power, but it is gaining in that respect and also in freedom of movement. The cicatricial skin is gradually approaching nearer to the natural state; it is becoming less glazed and more pliable.

Bullets Detected in the Brain by the Röntgen Rays.—Von Bergman (*Berliner klin. Wochenschrift*, 1898, No. 18) reports two cases of the detection by Röntgen rays of bullets within the brain substance. Skiagraphs were taken in both the anterior and lateral planes, but no attempt was made to locate either of the bullets absolutely. The author studied the symptomatology of the cases and the supposed location of the injury, as shown from our knowledge of cerebral localization, and found that many of the symptoms produced were the result of the traumatism which was caused by the passage of the bullet through various areas and tracts in the brain, and was not due entirely to its final location. The author believes the Röntgen ray method to be very valuable in determining the locality of these foreign bodies and in deciding on the advisability of removal. If they lie in areas in which their encysting would lead to very little injury, and where there would be little danger of further trouble arising from them, he advises that they be left alone, and believes that attempts at removal would be more injurious than helpful. Most of the symptoms complained of are due to the traumatism inflicted on structures other than those surrounding the bullet, and would not be relieved by its removal. In the two cases reported no attempt was made at removal, as the location showed the tissues to be quiescent where the bullet lay.

The Diagnosis of Calculous Nephritis by Means of the Röntgen Ray.—It has heretofore been possible to detect only certain forms of calculi in the kidney, and the diagnosis has therefore been only positive in its character. Leonard (*The Philadelphia Medical Journal*, August 20, 1898) shows that recent improvements in technic and apparatus make it possible to repeat exposures under identical conditions and to produce a Röntgen ray

capable not only of penetrating the more opaque portions of the body, but also of differentiating between the less opaque structures.

The absolute conditions essential to the detection of calculi have been determined and proved by repeated clinical evidence, so that it is certain that under these known conditions any renal calculus must be detected, and that the absence of the shadow of a calculus in a negative showing certain definite details is conclusive evidence of the non-existence of all calculi in that region.

This is the evidence essential to a complete diagnosis that has been wanting. The value of such evidence in relation to renal disease is especially great in differentiating between the many conditions that simulate calculous nephritis. There are many cases of calculous nephritis in which the classical symptoms of stone are nearly all wanting, either from some peculiarity in the individual and the development of the calculus, or because it is so small as to produce few or only occasional symptoms.

The cases that go undiagnosticated to the post-mortem table are usually of this character, the gradual disintegration and destruction of the kidney or a sudden fatal attack of anuria terminating the disease, while, practically, all cases of renal lithiasis in their incipient stage, when diagnosis and operation are most valuable, may be considered in this group.

In three cases which have come under the author's observation the additional data furnished by the skiagraphs have been of great value in the subsequent operation, even in cases where it was known that stone existed previously. The author holds that all cases of suspected renal calculus should be submitted to this method of diagnosis before so serious a diagnostic measure as exploratory nephrotomy is employed; and, if for no other reason, it should always be employed to determine whether only one or both kidneys are involved, for the very nature of renal lithiasis makes it possible that a similar deposit has occurred in the other kidney.

Forcible Straightening of the Spine in Pott's Disease.—In reporting a case in which he has employed the procedure recently reintroduced by Calot, FREEMAN (*Annals of Surgery*, April, 1898) gives the following as the theoretical advantages claimed for this method: (1) Immediate, complete, or partial correction of deformity; (2) removal of pressure and irritation from the cord, resulting in some cases in relief from neuralgic and paralytic symptoms; (3) separation of the diseased surfaces of bone, thus avoiding pressure and irritation, which are supposed to favor continuance and spread of the disease; (4) gain in length of the spine; (5) avoidance of malformation of the chest-walls and injurious alteration of the position of organs.

The disadvantages which have been claimed are (1) production of a large cavity which may not fill up with sufficiently firm tissue; (2) non-formation of supporting masses of new bone and consequent weakness of the spine and recurrence of deformity; (3) rupture of tubercular material into the mediastinum; (4) increase of the disease by local injury, separation of fragments of bone, etc.; (5) production of tubercular meningitis or general tuberculosis; (6) injury to the cord or its membranes; (7) production of abscesses.

Certain of these objections undoubtedly have weight, while others are

more or less imaginary or at least are not greater than are met with in the correction of deformities due to tuberculosis elsewhere in the body. Considering the number of cases already reported and the favorable results obtained, we are certainly justified in operating upon reasonably recent cases, with not too great deformity, where but moderate force is required, and especially upon those with neuralgic or paralytic symptoms which do not tend toward improvement. The straightening process is, perhaps, more liable to relieve anterior pressure upon the cord than would a laminectomy. On the other hand, we must recognize that the method is yet in its experimental stage, and that we cannot speak with certainty as to the durability of its immediate achievements.

The Serum-therapy in Infections by Pyogenic Micro-organisms and in Erysipelas.—The value of serum-treatments in infections by pyogenic micro-organisms and in erysipelas have been carefully studied in an exhaustive series of experiments by PARASCANDOLO (*Wiener klin. Wochenschrift*, 1897, Nos. 38 and 39), from which he derives the following conclusions:

1. That he was the first to establish on a solid basis the theory of immunization of animals from infection by pyogenic cocci and those of erysipelas, and to produce a potent serum.

2. He also provided examples of a new variety of the streptococcus pyogenes and of erysipelas.

3. That the best culture medium for these bacteria is a peptonized and sweetened meat-bouillon.

4. That he has shown that the best method of increasing the virulence of pyogenic and erysipelas cocci is the preserving of the culture on a 2 per cent. sweetened and peptonized bouillon, and that this method is superior to all others.

5. That the highest grade of virulence which can be produced in pyogenic and erysipelas cocci is $\frac{1}{1000000}$ cm. which is capable of killing a guinea-pig of 400 grammes weight in forty-eight hours. A higher grade of virulence cannot be produced with our present means.

6. The best method of immunizing animals is by the use of toxins and not cultures of virulent bacteria.

7. That the best protective serum is that derived from animals immunized in this manner.

Total Extirpation of the Bladder for Neoplasms.—TUFFIER and DUJARIER (*Rev. de Chir.*, April, 1898), in discussing the operative procedures necessary in growths of the bladder, point out the following facts:

1. That the conditions differ considerably, according to whether the operation is primary or secondary to a cystotomy, with persistence of a urinary fistula. In the latter case the dissection is more difficult, and the danger from septic infection is greater.

2. The preferable incision is an inverted ⊥, the perpendicular portion separating the recti, while the transverse extends from one inguinal ring to the other.

3. The removal of the bladder is not very difficult, except when it is covered by peritoneum; here the dissection should be carried out cautiously,

especially at the summit of the bladder. Resection of the peritoneum is sometimes necessary, and should be done in preference to leaving a portion of the neoplasm. The further removal is easy, especially if the bladder is first released by dissections on its two lateral aspects. During all the dissection it must be drawn outward with forceps, as in a vaginal hysterectomy; thus all the dissection is done with the parts in plain view. If the bladder has already been opened a finger placed within facilitates the dissection.

4. The resection of the ureters can be made before or after they have been catheterized; the authors have found it just as easy to catheterize them after as before. The ureters are in close approximation to the inferior vascular pedicle of the bladder, and nothing is easier than to take all in a curved hæmostat and cut below it. The vessels are tied after the removal of the bladder, and the ureters catheterized.

5. The section of the neck of the bladder is also made after placing a hæmostatic clamp, as the venous bleeding would be profuse, but can readily be controlled after the bladder has been removed. After catching the larger vessels the general oozing may be stopped by the thermo-cautery, and at the same time the mucous lining of the urethra should be cauterized, thus preventing infection from that source.

6. The ureters are then catheterized, the catheters coming out of the abdominal wound.

In the female the authors prefer the operation of Pawlick, in which the vagina is used as a bladder after the removal of the ovaries to suppress menstruation.

In the male the transplantation of the ureters into the sigmoid flexure is the preferable operation. The patient has perfect control, and is obliged to evacuate the rectum only from three to eight times a day. No erythema of the anal region or injury of the kidneys has been noted. The ureter may be fixed with the buttons of Boari or Chalot, or the use of sutures after the technique of Krynski may be preferred.

A Method of Exposing and Operating on the Kidney Without Division of Muscles, Vessels, or Nerves.—The following is the description given by MAYO ROBSON (*The Lancet*, May 14, 1898) of a new method of incision in operations on the kidney:

"The incision, beginning to the inner side of the anterior-superior spine of the ilium, is carried backward obliquely toward the tip of the last rib. The fibres of the external oblique and its aponeurosis are then split and retracted, exposing the internal oblique muscle, the muscular fasciculi of which are split in a line between the ninth costal cartilage and the posterior superior spine of the ilium, in which position they are longer than in front or behind that line. When the fingers are pushed through the internal oblique to split it, the fibres of the transversalis are pierced and can be retracted along the oblique muscle. A diamond-shaped space is thus formed, at the bottom of which is seen the transversalis fascia, which is then incised, exposing the perirenal fat, and on pushing the fingers through this the kidney is easily reached in whatever position it may lie. If needful, the whole hand may be introduced into the perirenal space, and the kidney can be grasped and freely manipulated, the retractors for the moment being withdrawn. If

the vessels are moderately long, and in all cases of movable kidney, the organ may be brought through the wound and explored by incision or by needling, or it may be examined by the selenium screen and the Röntgen rays. Should a calculus be found it can be extracted and the wound sutured before the organ is returned.

"The advantages of this method of exploring the kidney are obvious: 1. There is no division of the muscles, and therefore no weakening of the abdominal wall, immediate or remote. 2. No vessels are divided, thus not only saving time, but rendering healing *per primam* more likely. 3. No nerves are severed, and therefore paralysis of the rectus and other muscles is avoided. 4. The operation is done with the patient lying on the back, to the great convenience of the anæsthetist, the operator, and his assistants, and to the manifest advantage of the patient, who is saved much unnecessary disturbance. 5. The great saving of time, as well as the diminution of hemorrhage, means lessening of shock, thus rendering the operation feasible when otherwise it might be questionable. 6. It is an important fact that diagnosis in kidney cases, especially in renal calculus, is by no means perfect, and if it can be proved that an exploration of the kidney can be done quickly, with little or no danger, and without subsequent weakness being left, the physician will be less loath to permit the surgeon to perform an exploratory operation after all other means have been fruitlessly tried. 7. Lastly, after such an operation convalescence is materially shortened, as the patient may be safely allowed to be up at the end of the second week or even earlier, since there is no fear of the wound giving way."

The author, in addition, makes the following remarks: "Whenever I can, when operating away from the middle line of the abdomen, I make use of the principle of splitting instead of dividing muscles; for instance, in gastrostomy, in inguinal colotomy, in typhlotomy, sometimes in cholecystotomy, and nearly always in removal of the vermiform appendix. I would also point out that if it be found necessary to extend the opening—for instance, in case of operation on the ureter—deeply into the pelvis, it is easily accomplished by departing slightly from the principle here advocated and dividing the deep plane of fibres and further splitting the external oblique toward Poupart's ligament. The internal oblique will then require suturing to bring together the divided edges. In this way the ureter, even to its entrance into the bladder, may be fully exposed to sight as well as touch."

THERAPEUTICS.

UNDER THE CHARGE OF

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The Soluble Metals.—Dr. Oscar Werler presents an able plea for the use of soluble metallic silver in the treatment of septic wound-infection (blood-poisoning). Following Credé, he believes that a metallic silver in

fluid condition, changing in the body into the antiseptic salts, is the only available form. This has been obtained as a colloidal substance, almost entirely soluble in water and albuminous fluids, which apparently hinders the development of or destroys certain pathogenic germs when introduced into the organism, and permeating the organisms by means of such a substance, which of itself can do no harm, it is of obvious advantage to the physician, practically giving him the same certainty which has hitherto been enjoyed by the surgeon, and even extending the field of the latter. As an example of acute sepsis, an instance of an acute diffuse septic phlegmon of the dorsum of the hand following infection of the index-finger is cited. Here incipient universal septicæmia is evident from perusal of the report. Five grains of soluble silver ointment were rubbed into the skin of the healthy side for twenty minutes each day. Externally, cold applications of 1 to 4000 solution of silver citrate were applied. Immediate improvement in the general condition followed, so that it could be said that the progress of the disease centripetally was checked and the septic process remained localized. Four days later the general condition was satisfactory, and local healing was already established. A chronic septic infection resulting from an erysipelatiform phlegmon, caused by fissuring chronic eczema of the foot, received double the above amount of soluble silver ointment, which was daily rubbed into the breast and back. In ten days the local disability and general symptoms had entirely disappeared. The chronic septic infection following multiple chronic furunculosis next attracted attention. Here, also, the silver citrate solution was used locally, while forty-five grains of the soluble silver ointment were applied by inunction. In this instance two weeks sufficed to bring the disease under subjection. He concludes: 1. That in this, with an early diagnosis and in the absence of severe secondary affections, we have a successful internal remedy. 2. This is satisfactory in both acute and chronic sepsis and in furunculosis. 3. The most energetic action follows the use of a soluble silver ointment by the method of inunction, which carries the remedy immediately into the circulation, and there, by the development of bactericidal silver salts, there results complete antisepsis and disinfection of the entire organism. The ointment employed contains 15 per cent. of soluble silver.—*Deutsche medicinische Wochenschrift*, 1898, No. 40, S. 73 (*Beilage*).

The success obtained with silver has led to the production of mercury in colloidal form, which is also soluble. The properties which a chemically pure metal, soluble in water, present are of great interest from the stand-point of pharmacology. The gentle physiological action, free from irritation, permitting accurate dosage and an avoidance of poisonous by-symptoms, and which allows a rapid and certain absorption, warrants the use of allotropic colloidal mercury. This is a substance of metallic lustre, dark-brown in color, permanent, and soluble in water. It may be employed as: 1. The ointment for inunction. 2. A 1 or 2 per cent. dark-brown, aqueous solution for subcutaneous injection. 3. A pill containing one-sixth of a grain. 4. Tablets of fifteen grains for preparation of solutions and for baths in diseases of children. 5. A plaster for local application (enlarged glands, ulcerations). The strength of the ointment most generally useful is 10 per cent.—*Berliner klinische Wochenschrift*, 1898, No. 42, S. 937.

Sodium Chlorate in the Treatment of Hyperchlorhydria.—Dr. Maurice Soupault employs this drug in daily amounts not to exceed two drachms. It is well known that large doses are toxic, producing albuminuria, methæmoglobinuria, and even bulbar symptoms. But this amount can be continued for months with safety, provided it is not given to persons suffering from renal lesions. It should be administered twice or thrice daily in a warm solution, as far as possible from meals, so that it may act directly upon the gastric mucous membrane. Generally speaking, all dyspeptics are benefited. In cancer the pain, nausea, and vomiting disappear, the patient eats more and with less disgust, and hemorrhage ceases. The general condition improves, although there is no reduction in the size of he tumor. Especially in the hypersthenic dyspepsias (hyperchlorhydria) and in those conditions which depend upon it (gastrosucchorrhœa and gastric ulcer) are the beneficial results more apparent. Those patients very slightly benefited by alkalies or lavage show a striking and permanent improvement after a few days' treatment. In the gastralgias so frequent with these conditions the results are brilliant. On the other hand, in the asthenic dyspepsias (nervous or nervo-motor of Mathieu) the result is doubtful or unsatisfactory. The action of the remedy probably lies in the diminution of the inflammatory phenomena, the catarrh and congestion of the mucous membrane, and possibly in healing the erosions and superficial ulcerations; the result is the disappearance of the hyperæsthesia and exaggerated excitability of the stomach. Chemical investigations show that the acidity is but slightly influenced, and that the chlorine content is unchanged. However, the gastric secretion is diminished in quantity and even gastrosucchorrhœa ceases. —*Les Nouveaux Remèdes*, 1898, No. 18, p. 409.

The Therapeutic Uses of the Suprarenal Glands.—Dr. W. H. Bates states that it is essential to remember that the active principle of the gland is incompatible with preservatives, and that it is weakened by heat; consequently it must be freshly prepared. Ten grains of the dried gland should be dissolved in two drachms of water and the solution filtered. The aqueous extract is the most powerful astringent known. A drop of the 1 per cent. (above) solution instilled into the eye whitens the conjunctiva of the globe and lids in from forty seconds to two minutes. It has no anæsthetic or antiseptic properties. For operations upon the eye it will relieve congestion so that cocaine-anæsthesia can be instituted. In various inflammatory conditions its use is indicated. Stricture of the nasal duct when caused by inflammation is relieved, and other strictures may be benefited by it. In diseases of the skin, even when it is unbroken, local anæmia can be produced, as in the inflamed skin of a burn, an eczematous patch, intertrigo, and it has been recommended to prevent the pitting of smallpox. In one instance of pernicious anæmia it produced a marked increase in the number of red blood-corpuscles. Since this substance has been demonstrated to be a tonic to the heart muscles, and blood tension is enormously increased by its subcutaneous use, its employment is suggested in cardiac disease. The hypodermatic injections may give rise to local pain; the use of it *per os* is somewhat uncertain. In one instance of exophthalmic goitre there was decided improvement in the action of the heart and in the general muscular

strength. The goitre almost entirely disappeared, the tremor was not very marked, and there was considerable gain in strength. The remedy is a pure astringent in all inflammations, and a hæmostatic and a tonic to all muscle fibres, especially to those of the heart. It should be administered as an aqueous extract, a few drops being placed on the tongue.—*Medical Record*, 1898, vol. liv. p. 516.

The Treatment of [So-called] Bronchial Asthma.—Dr. Carl von Noorden strongly recommends the use of atropine. Commencing with the daily amount of one one-hundred and twentieth of a grain *per os*, the dose is increased by this amount every two or three days until the daily dose of one-sixteenth of a grain is reached. Then the amount is gradually diminished, the duration of the treatment averaging four to six weeks. This should be repeated every six months, but throughout less time and with smaller doses. These doses, beyond giving rise to some dryness of the throat and disturbance of accommodation, do not cause unpleasant symptoms as regards the heart save that the pulse is slightly more frequent.—*Therapeutische Monatshefte*, 1898, Heft 10, S. 539.

The Treatment of Lobar Pneumonia by Creosote Clysters.—Dr. E. Schoull cleans the bowels by enema and then administers twenty to forty drops of this in a clyster, twice daily. He believes that in this way either the pneumococcus is destroyed or its virulence considerably diminished. The disappearance of the fever and other general symptoms, while the physical signs persist, demonstrates that the gravity of the disease depends upon the toxins secreted by the microbe. The lesion itself develops in an aseptic manner without seriously disturbing health. These injections, indeed, regulate the disease.—*Bulletin Général de Thérapeutique*, 1898, t. cxxxvi. p. 133.

Treatment of Laryngeal Tuberculosis.—Dr. Walter F. Chappell reports upon nineteen patients treated under favorable climatic and systemic conditions. The various remedies in ordinary use for local treatment—creosote, lactic acid, ichthyol, iodoform, silver nitrate—were employed according to especial indications. Of laryngeal ulcerations, eight healed; two improved; two only were not improved. Seven laryngeal thickenings improved. In several instances the voice returned to its normal tone, and laryngeal cough and irritation entirely subsided. Relief of pain was marked. Every instance of laryngeal improvement was accompanied by pulmonary improvement, and the general condition was bettered. If special attention is paid to the upper respiratory tract in every tuberculous patient the frequency of laryngeal tuberculosis will be diminished.—*New York Medical Journal*, 1898, vol. lxviii. p. 368.

Pure Essence of Melaleuca Viridiflora.—Dr. Dubousquet de Laborderie has experimented with this substance for several months. It is obtained by distillation of the fresh leaves, and is also known as gomenol and essence of niaouli. It occurs as a slightly oily liquid of the specific gravity 0.922, neutral in reaction, of an amber color, a pleasant and aromatic odor

intermediate between camphor and menthol, and a sharp taste, leaving a cooling sensation like menthol or peppermint. It is insoluble in water and glycerin, but soluble in oils, alcohol, ether, benzine, and petroleum. Chemically, it consists of: (1) aldehydes; (2) a turpentine carbon ($C_{20}H_{16}$); (3) most important of all, eucalyptol ($C_{20}H_{18}O_2$); (4) a terpinal ($C_{20}H_{18}O_2$; (5) polymers of $C_{10}H_{16}$ and resinous products, and (6) a sulphur compound in traces. Its advantage over similar essences of cajeput and eucalyptus lies in the very small quantity of aldehydes, which are always poisonous, which it contains. Besides, it is the only essence possessing a citrene. It contains a large proportion of the most important body, eucalyptol (66 per cent.), and is a natural terpinol. Experiments have been made in (1) respiratory diseases, notably pulmonary tuberculosis; (2) diseases of the kidney, bladder, and urethra; (3) painful affections, rheumatic and neuralgic; and (4) in surgery. When taken at meal-times it produces an agreeable sensation of warmth in the stomach similar to that of brandy or champagne. The remedy is administered in five-drop capsules, of which eight or ten may be given in certain cases. Hypodermatically it is given as a 20 per cent. solution in olive oil, of which the dose is from one-half to three drachms. The injections have not been painful nor badly borne. The results in pulmonary tuberculosis have been favorable in causing the bacilli to diminish or disappear. The symptoms of the disease are lessened, particularly after subcutaneous injection and in arthritic patients and in the early stages or in the torpid forms of the disease. With patients who tend toward the congestive and erethitic forms of disease the remedy should be administered more carefully, so that the expectoration shall not be completely suppressed lest the congestion and dyspnœa be increased. In the early stages the local and general effects are satisfactory, amelioration if not cure following the treatment. In the later stages its advantages are that the lungs are disinfected and the cough and expectoration diminished. For urinary diseases it is valuable in that it does not cause albuminuria nor aggravate it if it already exists. In cystitis secondary to prostatic enlargement, irrigation with a 2 per cent. solution cleared the urine. For embrocation a 10 to 90 per cent. balsam, the strength being determined by the intensity of the disease, has been employed with success. For this remedy the claim is made that it possesses antispasmodic, analgesic, and anticatarrhal properties. It is neither toxic nor caustic, and can be used subcutaneously. —*Bulletin Général de Thérapeutique*, 1898, 1re liv. p. 1.

The Effects of Different Anæsthetics upon the Kidneys.—Drs. W. H. Thomson and Robert Coleman Kemp conclude, from laboratory experimentation, that ether appears to produce a special contraction of the renal arterioles, with a consequent damaging effect upon the renal secretory cells so that the kidney shrinks in bulk, secretion is diminished, albuminuria supervenes, and finally there is suppression. This change in the condition of the kidney is not due to any change in the general arterial circulation. The effect of chloroform upon the kidney is *nil*. The secretion of urine continues up to the last moment of life, and the albuminuria is so slight that its presence is apparently due only to respiratory interference. The alcohol-chloroform-ether mixture shows the special effects both of ether upon the kidneys

and of chloroform upon the heart, according to the mode of administration. If a large percentage of air be simultaneously inhaled, the effect is that of chloroform, cardiac depression, without the effect of ether upon the kidneys. If the mixture is used as ether is generally administered, we have both the cardiac depression of chloroform and the renal derangement of ether combined. These objections appear to be still more applicable to Schleich's anæsthetic, for both these disadvantages are present to a greater degree than with the first-named mixture. The practical conclusions are: 1. That ether is contraindicated as an anæsthetic when renal disease is present, and particularly when, with albuminuria, there is a tendency to pulmonary œdema. 2. Chloroform is directly depressing to the heart, but does not affect the kidney. 3. There is no advantage in the alcohol-chloroform-ether mixture, but rather the reverse. 4. As for the Schleich mixture, there is a physical reason for doubting the manageability of mixed anæsthetics, due to the fact that if two agents of different maximum points of evaporation be mixed together the more volatile of them will increase the evaporation of the other, by carrying off more of the less volatile one than if the latter were vaporized by itself. That similar mixtures have been used in a number of cases without dangerous effects is no evidence that they are safe. The claim of Schleich, that mixtures of different anæsthetics of different volumes—*i. e.*, maximum evaporation points—are safer than the administration of these anæsthetics alone, is based upon the assumption that the absorption of an anæsthetic as to quantity depends upon its boiling point; the more volatile, the less is absorbed into the blood in a given time. Since these mixtures do not result in a new chemical homogeneous substance of definite chemical proportions, the exact amount of each ingredient absorbed cannot be determined.—*Medical Record*, 1898, vol. liv. p. 325.

[The observation of a considerable number of instances of the use of the Schleich mixtures in the hands of those advocating their use demonstrated to us that these, like all other mixtures, present all the disadvantages, without the advantages, of the individual contained substances.—R. W. W.]

The Treatment of Rhachitis.—Dr. Lor insists upon proper feeding and sea-baths, either hot or cold, according to the season. He prescribes phosphorus systematically, as follows: Phosphorus, 0.01; lipanine (pure olive oil with 6 per cent. of oleic acid), 30; powdered sugar, 15; powdered gum, 15; distilled water, 40. Of this a teaspoonful a day represents one-sixty-fourth of a grain of phosphorus. Large children of good digestion may take the drug dissolved in cod-liver oil. No serious disturbances have followed the use of this remedy, but it is well to omit it for four days out of every twelve. —*Revue de Thérapeutique Médico-Chirurgicale*, 1898, No. 21, p. 726.

Treatment of Acute Urethritis in the Male.—Dr. James Pedersen, in the eradication of the etiologic micro-organisms, recommends protargol in from ½ to 1 per cent. solution as forming a clean and stable solution, unlikely to irritate, and as rapidly bactericidal. Gonococci have disappeared from the pus within two days under the administration of a 1 per cent. solution of this substance. For this time the discharge increased, then subsided, and by the sixth day became only a morning drop. The injections

should, however, be continued at less frequent intervals until the gonococci cease to reappear. To terminate the inflammatory process zinc iodide and zinc chloride, of each one grain to four fluidounces of distilled water, may be used cold. If there is much inflammatory swelling of the mucous membrane the injection should be used as hot as the urethra will comfortably bear it. To repair the damaged mucous membrane silver nitrate in solution is by far the best agent because the safest and most efficient. This is to be applied by the syringe, syringe-sound, or by means of cotton through the endoscope. Solutions of from 0.1 to 2 per cent. may be employed; the last strength must not be exceeded. For the applications through the endoscope 1 per cent. is the proper strength.—*Philadelphia Medical Journal*, 1898, vol. ii. p. 336.

Dr. P. Unna notes the necessity of injections during the night as well as in the day at two-hour intervals. This is to be carried out faithfully until there is found no "morning-drop." For the next week the injections are to be administered every three hours, both at night as well as by day. Following this the interval is to be lengthened by one hour each week until, at the end of eight weeks, but one injection daily is needed. If the infection is mild the intervals may be longer, even at the outset. The formula is: zinc sulphocarbolate, 1; resorcin, 4; fennel water, 20.—*Monatshefte für practische Dermatologie*, 1898, Heft 1, S. 20.

Dr. Oscar Werler claims for aqueous solutions of silver citrate that: 1. They possess a powerful bactericidal action in that they rapidly and thoroughly kill gonococci. 2. When used by injection they are mild, painless, and unirritating, thus not adding to the inflammation nor creating lesions in the mucous membrane. 3. Further, they act deeply, so that they reach the gonococci in the submucous connective tissue without injuring it. Certain points in procedure are worthy of definition. 1. The injections should be commenced as soon as the patient presents himself after infection, not only to destroy the gonococci, but as well to establish antisepsis of the urethra. 2. The injections should be made four or five times each twenty-four hours, and this number diminished until, at the end of two or three weeks, only the evening injection is required. 3. The amount used is from one and one-half to two drachms. 4. The injection should be retained from ten to fifteen minutes. 5. The strength at the beginning is one to ten thousand, which may be increased until one to four thousand is reached. 6. When the solution is lukewarm fewer unpleasant symptoms are observed. This is accomplished by placing the bottle containing the solution in hot water before the injection is made.—*Berliner klinische Wochenschrift*, 1898, No. 16, S. 358.

The Treatment of Toxic Amblyopia.—Mr. Harold B. Grimsdale states that, while withdrawal of alcohol and tobacco generally suffices for recovery from the amblyopia caused by them, yet usually a mixture of the tinctures of nux vomica and cinchona seems to bring about a more rapid improvement. Recently, arguing by analogy from the benefit which results in cases of general toxæmia from large injections of saline solutions, De Wecker concludes that in these cases, also, when the toxæmia is apparently limited in its action to certain sensory nerves, a similar method would be

successful. Cheron's solution, which contains sodium chloride, 2 per cent.; sodium sulphate, 8 per cent.; sodium phosphate, 4 per cent., and carbolic acid, 1 per cent., is injected in amounts varying from two to three and a half ounces, care being taken to inject it slowly. It is stated that as much as thirty-five grains of phenol can be injected without ill effects.—*Treatment*, No. 12, p. 353.

A New Preparation of Thyroid (Thyroglandin).—Dr. William McLennan states that the thyroid gland may be administered either in the raw state or dried at a gentle heat under the coagulating point of the albumin. To either of these forms there are obvious objections, because animal substances foreign to the essential active principles are almost certain to be present, and bacteria of a dangerous kind may be introduced into the system of the patient. The thyroid contains two important principles: one of these is iodoglobulin, the larger constituent, and the other is thyroidin, discovered by Baumann. Both contain iodine, and both are requisite to produce the specific effects of the gland itself. Of the chemical processes hitherto introduced with the object of separating the active principles from the animal substances none is effectual in preserving the form or proportion in which they are contained in the gland, and consequently the results of these processes have not the same medicinal effect as the gland itself. Thyroglandin is prepared as follows: (1) Selected and healthy glands are macerated in cold water, which extracts the soluble iodoglobulin. This solution is decanted or filtered off, and is evaporated to dryness at a temperature of 212° F. The resulting product is reduced to a fine powder. (2) The residual glands are then boiled for one hour with a weak solution of caustic soda, which eliminates the thyroidin. After filtration the solution is exactly neutralized with hydrochloric acid, evaporated to dryness, and powdered. (3) The two powders so obtained are mixed together. It will be seen that by this method of preparation thorough sterilization is secured and every deleterious substance which might be derived from the other animal substances of the gland is removed, and finally the two important constituents are retained in the form and in the proportion in which they exist in the gland. This preparation, if kept thoroughly dry, does not deteriorate, and may be administered in capsule or tablet in dose of from three to five grains, equalling about one-half of a gland of average size and weight. Four instances (three of obesity, one of myxœdema) of its use are reported. —*British Medical Journal*, 1898, No. 1958, p. 79.

Superheated Air (Tallerman's Method).—Dr. Martin Mendelsohn points out the various effects of local application of superheated air—the subjective local sensations with these varying from slight to marked feeling of warmth. Local and general perspiration is induced often in amounts from sixteen to twenty-five ounces; to this loss of perspiration the reduction of body-weight is due. The body-temperature rises, but usually less than 2° F. The pulse-rate increases slightly during the application of the method, and upon its cessation gradually returns to its normal rate. From these observations the harmlessness of the method is claimed, and in addition its slight and temporary influence upon the general condition of the patient.—*Zeitschrift für Diätetische und Physikalische Therapie*, 1898, Heft 1, S. 52.

GYNECOLOGY.

UNDER THE CHARGE OF
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The Relation Between the Thyroid Gland and the Female Genital Organs.—FREUND (*Centralblatt für Gynäkologie*, 1898, No. 32), replying to a recent criticism by de Voogt, calls attention to the fact that he (Freund), while pointing out the fact that the thyroid gland may undergo temporary enlargement physiologically under the influence of pregnancy and the puerperium, showed that permanent increase in size is noted only in cases in which the uterine muscle is subject to active and prolonged irritation. Of fifty-six cases which were carefully observed, forty four were instances of fibromyoma. In none of these was there any reason to suppose that the glandular enlargement was due to struma, as in the case reported by de Voogt.

Malignant Tumors of the Ovary.—GEYER (*Inaugural Dis.; Centralblatt für Gynäkologie*, 1898, No. 32) reports the results of operations for malignant neoplasms of the ovary at the Würzburg Clinic during seven years: 55 out of 239 cases of ovarian tumor, including papillomatous cysts, were malignant. Of these, 23 were inoperable; 16 of the 32 in which an operation was performed were cancerous, 8 patients succumbing to the operation. Recurrence occurred in three instances, 20 per cent. of the patients being cured; 81.8 per cent. of the cases of papillomatous cyst had no recurrence, and two patients died. The total percentage of cures in all cases was 46.8 per cent.

Rupture of the Ovary with Intraperitoneal Hemorrhage.—DEPAGE (*Ann. de la Soc. Belgique*, 1898, No. 1) reports the case of a young girl who developed symptoms of acute peritonitis supposed to be due to perforation of the appendix. When admitted she was extremely anæmic and in profound collapse, with tympanites and evidences of fluid in the abdominal cavity. Cœliotomy was performed after subcutaneous injection of saline solution. A quantity of fluid blood escaped as soon as the cavity was opened, the source of the bleeding being a ruptured ovary, which was enlarged to three or four times the normal size and was the seat of interstitial hemorrhage. The patient made a good recovery.

Infection of Ovarian Cysts.—HEINRICIUS (*Ann. de Gynécologie*, 1897, No. 4) reports a case in which the contents of a simple ovarian cyst became infected after delivery, probably from the uterus, as the lochial discharge contained septic organisms. The lymphatics or veins were doubtless the channels through which the infection was conveyed. Similar organisms were found in the peritoneal exudate.

SCHWARTZ (*Ibid.*) observed three cases of infection in cysts, two of the

patients being puerperæ. In the third case the patient was a young girl. Although tuberculosis was suspected, no bacilli could be found in the cyst contents.

Disinfection of the Hands with Alcohol.—TJADEN (*Zeitschrift für Geb. u. Gyn.*, Band xxxviii., Heft 3) draws the following conclusions from a series of nearly four hundred bacteriological observations: 1. Different micro-organisms are differently affected by contact with alcohol. 2. The thickness of the layer of tissue upon which the alcohol acts is an important factor in the germicidal effect. 3. The drug acts more intensely if the bacteria are not dried. 4. Alcohol of a strength of 75 to 90 per cent. is a stronger germicide than either absolute or 50 per cent. alcohol.

Practically, the writer advises that Fürbringer's method of disinfection be modified by dipping the hands in alcohol after soaking in sublimate solution, and again dipping them in sublimate.

Papilloma of the Fallopian Tube.—DOLÉRIS and MACREZ (*La Gynécologie*, August 15, 1898) report a third case of this rare condition, previously described by Sutton and Doran. They conclude that this papillomatous condition of the mucous membranes of the tube due to salpingitis is probably not so infrequent as is usually supposed. It is often attended by a profuse watery vaginal discharge, as well as by an intraperitoneal effusion. Tubal papillomata are benign, like those on the external genitals. They result from chronic salpingitis of a low grade, unaccompanied with inflammatory reaction or pain, the health of the patient being usually not affected. On account of their obscure pathology they deserve careful study.

Benign Tumors of the Clitoris.—LAMBRET (*Revue de Chirurgie*, May, 1898) analyzes the reported cases of benign neoplasms of the clitoris. Cysts are classified as hemorrhagic, dermoid, and retention. Of the former only three cases have been reported, the size varying from that of an egg to that of a child's head. Two cases of dermoid have been observed in this region. Winckel is the only writer who describes a sebaceous retention-cyst of the clitoris. Solid tumors are more common, thirty-one examples having been noted; three of these were osseous or cartilaginous, the others fibromata. The latter are never encapsulated, but the entire clitoris seems to be transformed into a fibrous mass containing elastic fibres and fatty tissue. The labia minora often share in this hypertrophy. Although the growth of the tumors is slow, pregnancy causes it to become markedly accelerated. Extirpation is easy, and there is no reported instance of recurrence.

Retroflexion of the Uterus.—SIELSKI concludes an extended paper on this subject (*Centralblatt für Gynäkologie*, 1898, No. 33) with an allusion to Theilhaber's criticism that in the majority of cases in which retroflexion has been corrected by operation the symptoms persist in spite of the fact that the uterus remains in its normal position. This is the case, the writer affirms, because the normal relations of the uterus are not restored, since the natural range of mobility of the organ is limited by fixation of the fundus. Coitus, pregnancy, normal filling of the bladder—all these processes are

more or less interfered with. In short, the cure of retroflexion consists not in reposition and fixation, but in reposition and mobilization of the uterus.

The Prophylaxis of Retroflexion of the Uterus.—ABEL (*Centralblatt für Gynäkologie*, 1898, No. 30) affirms that the most important point in the prevention of retrodisplacement is the proper care of the puerperal woman, since Winter affirms that this condition is present in 12 per cent. of primiparæ. The critical period is the beginning of the second week, when the degeneration of the muscular fibres has advanced and before the connective tissue has regained its elasticity. Instead of stimulating the intestines by liberal diet, it is the custom for the medical attendant to keep the puerperal woman on fluids, resorting to the frequent use of laxatives.

The writer criticises the American (?) custom of allowing patients to use the commode on the fourth day after delivery. On the other hand, he does not agree with Schatz that it is desirable to keep them in bed for two or three weeks until the pelvic floor regains its tone. Every puerperal woman should be examined in order to determine if her uterus is in its normal position. Gottschalk advises the use of a pessary as early as the seventh day after delivery if there is a tendency to retrodisplacement, the patient being kept in bed three or four weeks. If a pessary is introduced it should be as small as possible, in order not to cause overstretching of the vagina. He would have the patient lie on her side as much as possible and empty her bladder every four hours.

The writer believes that long-standing retroflexion of the uterus which has given rise to no symptoms may cause profuse hemorrhages at the time of the climacteric and delay its establishment. This may be prevented by the timely use of a pessary. Quoting statistics to show the relative frequency with which retroflexion follows removal of the tubes and ovaries, the writer infers that it is not sufficient to separate adhesions, but the uterus should be fixed in a normal position by some procedure. In twenty-six cases in which conception followed the removal of one tube and ovary the uterus became retroflexed in 50 per cent.; in others spontaneous reposition of the retrodisplaced organ occurred during the course of pregnancy.

Operations for Genital Prolapse.—GRÖNHOLM (*Finska Läk. Handlingar; Centralblatt für Gynäkologie*, 1898, No. 33) concludes a paper on this subject as follows: 1. In cystocele alone anterior colporrhaphy and repair of the pelvic floor were successful in 41 per cent. of the cases. 2. In combined cystocele and rectocele, 21 per cent. of cases followed anterior colporrhaphy and colpo-perineorrhaphy. 3. Plastic operations on the vagina are usually sufficient in uncomplicated cases of prolapsus uteri. 4. In older, hard-working women, with long-standing prolapse and hypertrophy of the cervix, also in the case of nulliparæ, or where prolapse recurs after former operations, plastic work on the vagina and ventro-fixation are indicated. 5. Ventro-fixation is always (?) indicated in cases of primary acute (?) prolapse. 6. In obstinate cases of recurrence, or when uterine neoplasms are present, it is advisable to perform total vaginal extirpation supplemented by operations on the vagina.

SCHMID (*Inaugural Diss.; Centralblatt für Gynäkologie*, 1898, No. 33) col-

lected the histories of 237 cases of prolapse operated upon in Wyder's clinic. Seventy-two patients were seen at different periods after operation; 14 had a recurrence; in 2 the operation was a failure. Hegar's method was used in 150 cases; Tait's, in 70; total extirpation was resorted to six times on account of neoplasm, three of these patients requiring secondary operation for vaginal prolapse. Two patients died after operation, one from tetanus and one from sepsis.

MEINERT (*Inaugural Diss.*), writing of the prognosis of operations for the cure of prolapse, cites 40 cases, 23 of which were kept under observation; 21 cases in which the various plastic operations, including in a few instances ventrofixation, were performed were regarded as cured. Of these, only 12 were permanently cured; the recurrence took place, as a rule, after delivery or severe bodily exertion, at periods ranging from two to nine years.

Piccoli's Operation for Inversion.—SAVA (*Arch. di Ost. e Gin.; Centralblatt für Gynäkologie*, 1898, No. 33) reports a case of inversion of four months' standing, which resisted all the usual attempts at reduction. Three months later the following operation was performed: A transverse incision was made through the posterior vaginal fornix and the peritoneal cavity was opened. The index-finger was passed through this opening into the funnel-shaped cavity formed by the inverted uterus. Using this finger as a guide, with a blunt-pointed bistoury the posterior uterine wall was divided from the os externum to the fundus. The reduction was then easily effected, after enlarging the vaginal wound by a second vertical cut, when the incision in the uterus was closed with interrupted silk sutures. A gauze drain was placed in the vaginal wound after partly closing it. The patient made a good recovery.

Spastic Retroposition of the Uterus.—Under this term, SCHÜTZ (*Wiener med. Presse*, 1897, No. 51) describes a condition which he has found during dissections in which the sacro-uterine folds are attached to the uterus at a higher level than the os internum, while their sacral insertion is as high as the third or fourth vertebra. When they contract the result would be to bring the uterus into a position of retroflexion. This explains the clinical fact that in some cases the uterus at one time appears to be retroposed, and even fixed; while at others the same organ is found to be in its normal position and perfectly movable. The writer infers that this is a condition of "spastic retroposition," due to a sudden contraction of sacro-uterine ligaments which have the high insertion previously described.

[The writer fails to emphasize the essential difference between retroflexion and retroposition of the uterus. Attention has frequently been called to the fact that in the common cases of anteflexion with retroposition the marked shortening of the sacro-uterine ligaments, supposed to be due to a cicatricial contraction following posterior parametritis, often disappears entirely under anæsthesia, proving that it is purely of spastic origin. The suggestion with regard to the high insertion of the ligaments is an interesting one.—ED.]

OBSTETRICS.

UNDER THE CHARGE OF

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Lysol Poisoning Following an Intra-uterine Douche.—In the *Centralblatt f. Gynäkologie*, 1898, No. 39, CRAMER reports an interesting case as follows: The patient was a primipara, aged twenty-two years, who was taken in labor and examined by a physician at her home. She was sent to the hospital at Bonn, where it was found that she was seven months pregnant, in labor, the fœtus presenting by the breech. The birth of the child was not especially difficult, and the placenta was entirely expelled without delay. The patient received a vaginal douche of 1 per cent. lysol. Several hours later she had fever and rapid pulse, and the uterus was washed out with lysol, 1 per cent. The uterus was strongly anteflexed, and difficulty was experienced in introducing the douche tube. After a litre and a half of the solution had been used the patient suddenly became restless, breathed heavily, and became unconscious. The pulse was rapid and weak. In a few moments she became conscious and complained of giddiness. The pulse and temperature fell. Her child perished soon after birth, and autopsy revealed no cause for its death.

The patient developed icterus and abdominal tenderness. The urine was dark brownish-black, full of casts and blood-cells. There was considerable albumin present. An examination of the urine for phenol did not give a clear reaction. Tribromophenol was found, however, in considerable quantity. The patient died from exhaustion on the tenth day after confinement, with symptoms which were difficult to explain clearly.

On autopsy it was found that septic infection was present. At the fundus of the uterus there was an area of ulceration, from which thrombi had extended into the pelvic veins. There was also an acute hemorrhagic nephritis.

In commenting upon the case, Cramer calls attention to the condition of the urine, which contained albumin and abundant débris from the kidney. Regarding the manner in which absorption occurred when the douche was given, it is thought that lysol entered directly into the blood current through surfaces opened by ulceration. Experiment has shown that the injection of carbolic solution into the bloodvessel of an animal causes sudden collapse, exactly like that observed in this case.

Whether this alone would have proved fatal is very doubtful. A severe septic process was present in the endometrium quite sufficient to have brought about a fatal result. There were reasons for believing that the birth had been criminally induced, and abundant opportunity for septic infection had occurred. An interesting symptom in the case was the strong, full pulse,

which the patient had after the first shock following the injection. This is often seen in eclamptic patients, and is very significant of acute nephritis in the pregnant woman.

It has been Cramer's custom to employ intra-uterine douches of from 0.5 to 1 per cent. lysol, using from ten to fifteen litres, and he has seen nothing but the best results from this usage. The case reported would not incline him to abandon this method of treatment.

Post-natal Transfusion and its Importance for the Fœtus.—In the *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1898, Band xxxix., Heft. 1, KÖSTLIN reviews this subject and gives the results of his own experience. He first endeavored to ascertain how much blood from the mother passed to the fœtus after its birth and before the separation of the cord. To determine this he weighed the children directly after their birth and before the cord was tied, and then after the cord was separated. He also endeavored to ascertain how much blood passed from the cord as soon as it was cut. His observations were conducted upon the children of thirty primiparæ and thirty multiparæ. As regards the aspiration of blood by the child from the placenta, he did not find that such was the case. In common with other observers, however, he found evidences that the child gains decidedly in weight during the short time which elapses between birth and the separation from the mother. He found that the children of primiparæ gain less than those of multiparæ. The greater the weight of the child the greater also its gain.

As regards the exact way in which the blood passes from mother to child, he ascribed it to contractions of the uterus during the latter part of labor, which forced the blood from the maternal into the fœtal portion of the placenta. The blood-pressure in the fœtal vessels becomes much increased as birth proceeds. Uterine contractions occurring after labor are of comparatively slight importance.

He obtained little results from weighing children during the first ten days after labor. His experiments confirm the belief that it is best for the child to allow some moments to elapse after birth before tying the cord.

A New Cranioclast.—FEHLING (*Centralblatt f. Gynäkologie*, 1898, No. 43) has devised a new cranioclast with pelvic curve, composed, as usual, of two blades. When it is necessary to use a crushing instrument as well, he has devised a third blade fitting over the other two, which may be incorporated with them. A powerful compression-screw can be applied, converting the instrument into a cephalotribe.

Replacement of Retroverted Pregnant Uterus with the Elastic Balloon.—MÜLLER (*Centralblatt f. Gynäkologie*, 1898, No. 43) reports the case of a patient fifteen weeks pregnant, who had a retroversion of the womb with incarceration. Efforts at replacing the uterus failed, when it was determined to try a Braun's elastic bag. This was introduced into the vagina and carried as far back as possible The patient was encouraged to bear the pain which its presence caused, and after four hours the pain suddenly ceased and the uterus was found in a normal position. The patient went to full term and had a normal labor.

Treatment of the Retroverted Pregnant Uterus.—In the *Centralblatt f. Gynäkologie*, 1898, No. 38, AHLFELD reports the case of a woman in the early months of pregnancy who had retention of urine for fourteen days. She had had no passage from the bowels for eight days. When the catheter was introduced, a large quantity of decomposed urine was removed, with fragments of the mucous membrane of the bladder. The patient was placed on her side and the uterus carried part way out of the pelvis. A large ring pessary was inserted, and the patient was treated by washing out the bladder and giving remedies to render the urine normal. She was urged to assume the knee-chest position as often as possible. The pessary was examined from time to time and the uterus was found to be ascending gradually to its proper position. Two weeks after the beginning of treatment the womb was in a normal position and the cystitis had almost disappeared. Three weeks after her admission to the hospital she was discharged cured. She had a normal labor at the end of pregnancy.

Artificial Dilatation of the Mouth of the Uterus During Labor.—In *L' Obstétrique*, 1898, No. 4, DEMELIN contributes a paper upon this subject, giving the results of his experience in artificial dilatation of the mouth of the womb during labor. The method which he advocates is bimanual dilatation, inserting one or more fingers of each hand within the cervix and gently enlarging the os, until all the fingers can be introduced.

He employed this method in treating eleven cases of vicious insertion of the placenta and had among these patients no deaths. In eclampsia the method has given him satisfactory results. It is, of course, to be employed only when labor has already begun. If the patient shows no signs of labor, the eclampsia and toxic condition present must be treated independently of labor. If, however, such treatment produces no improvement after a reasonable time, labor ought to be induced.

He recommends this method in sudden death or threatened demise of the mother, in place of Cæsarean section. In the interests of the fœtus, this method may also be employed with a good chance of success. This is especially true where the cord is compressed or where the amnion has become infected

This treatment is especially indicated in abnormal presentations, such as the brow, the parietal bone, and cross births. It may occasionally be employed together with other operations, as before symphysiotomy and often before the high application of axis-traction forceps. When labor is so prolonged that maternal exhaustion is threatened, this method is also indicated.

Demelin lost two of his forty-nine patients, one from eclampsia and one from apoplexy. He urges caution lest the operator extract the child before complete dilatation has been secured.

Coiling of the Umbilical Cord in Twins Having One Amnion.—GEISLER (*Centralblatt f. Gynäkologie*, 1898, No. 38) reports a case of twin pregnancy in which there was one amniotic sac, one placenta, and one chorion, and in which the children were both males. The first was well developed and living and born in vertex presentation. The second had been dead for some time and had become partly mummified. The cord of the living child was encir-

cled in spirals by that of the dead fœtus, and in one portion a tightly fastened knot was present. It is remarkable that the circulation of the living child had not been interfered with in this way. The writer quotes twenty-one cases of a similar nature from the literature upon the subject.

The Presence of Meconium from a Medico-legal Aspect.—BESTLER (*Centralblatt f. Gynäkologie*, 1898, No. 38) examined seventy-four new-born children to determine at what time the meconium is entirely discharged. He found that it is not expelled until the second or fourth day, and in children fed from the bottle as late as the fifth or sixth. It is evident that the presence of meconium is not a reliable sign of the age of the child.

Microscopical examination of the meconium showed epidermal cells, crystals of cholesterin, and lanugo hairs. Meconium corpuscles were also present.

An Interesting Case of Missed Abortion.—IWANOFF reports, from the clinic at Moscow (*Centralblatt f. Gynäkologie*, 1898, No. 38), the case of a patient who had her last menstruation in April, 1897, and who came into the hospital in February, 1898. Soon after her admission she was suddenly taken with pain and bleeding, and expelled a four months' ovum. The placenta and ovum were hard and whitish in color.

On examining the specimen microscopically, characteristic villi were seen and also Langhan's cells and syncytium. In other portions it was seen that the decidua of the uterus had begun to regenerate in a normal manner. The patient made a good recovery.

The case is interesting because the patient had retained the ovum so long without pain and hemorrhage, and because the uterine decidua had entirely disappeared in some places and the normal endometrium had begun to form.

Missed Abortion.—SCHAEFFER (*Monatsschrift f. Geburtshülfe und Gynäkologie*, 1898, Band viii., Heft 4) reports an interesting case, in which a blighted ovum was retained 450 days in the uterus. The patient applied to the Heidelberg clinic, complaining of menstrual colic, and asking that medicine be given to bring on menstruation. She declined an examination at that time. Later it was found that the mouth of the womb was open and that an ovum was present in the cervix. The patient was given ergot, and shortly after the ovum was expelled.

On examination the ovum was long, pear-shaped, and resembled a fibrous polyp. On one side villi and placental masses could be made out, and on the other, decidua. When the sac was opened not a drop of fluid escaped. A few clots were in the amnion. The fœtus was 10 cm. long and mummified.

There was an extravasation of blood beneath the chorion, and blood also in the amniotic cavity. The fœtus was deformed; the left eye was lacking, some of the fingers were absent, and the feet were united.

The patient's history was that she had just passed through two menstrual periods, attended with considerable pain, for the first time in thirteen months. When her menstruation ceased, more than a year before, she had every reason to suppose herself three or four months pregnant.

In discussing the case Schaeffer draws attention to the fact that the ovular decidua in these cases will be longer preserved and better nourished than the

appendages of the ovum. The ovum being partially attached, the uterus does not treat it as a foreign body for some months. If the decidua of an ovum is not completely formed and abortion occurs, growth may go on after the death of the embryo. The ovum may be retained indefinitely until the endometrium has been sufficiently re-formed for menstruation to occur. From that time on, such an embryo becomes a foreign body. As a rule, the amniotic liquid persists. After the first months, however, this fluid is rapidly absorbed, as the conditions of the circulation in the embryo are favorable to such a process.

DERMATOLOGY.

UNDER THE CHARGE OF

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Dermatitis Herpetiformis Followed by Cicatrices and Epidermic Cysts.—BROCQ (*Annales de Derm. et de Syph.*, 1898, No. 7) reports a case of dermatitis herpetiformis with erythematous, vesicular, and bullous lesions, lasting a year and a half, in which the parts affected gradually took on a cicatricial aspect, and small epidermic cysts appeared similar to those observed in the affection described by Hallopeau as congenital bullous dermatitis with epidermic cysts. The treatment was by static electricity, which seemed to exert a general tonic effect and to allay the itching. In another case of vesicular dermatitis herpetiformis, in which static electricity was likewise employed, relief of the pruritus was also effected.

Ophthalmic Zoster Due to Potassium Iodide.—JACQUET (*Annales de Derm. et de Syph.*, 1898, Nos. 7, 8) presented to the Société Médicale des Hôpitaux de Paris a patient affected with a chronic blennorrhagic rheumatism, who, after the daily administration of 2 grammes of iodide of potassium for four days, developed a slight ophthalmic zoster accompanied by neuralgia of the right facial nerve. That the zoster was due to the iodide was probable from the fact that four years previously the administration of the same dose produced, at the end of some days, a left facial paralysis which lasted six weeks, and two years later the ingestion of the iodide was followed by severe dorso-lumbar pains.

Xeroform in the Treatment of Skin and Venereal Diseases.—PASCHKIS (*Wiener klin. Rundschau*, 1897, No. 42), who has employed this remedy in a large number of cases of venereal and other ulcerations, in eczema and various other diseases of the skin, has found its action very satisfactory.

Necrotic venereal ulcerations, as well as simple ones of the leg, cleaned off rapidly under its use, and healthy granulations soon appeared. A valuable feature of xeroform seemed to be the absence of all caustic action. It was usually applied as follows: After cleansing the surface of the ulcers with cotton, it was dusted on with a camel's-hair brush, and several layers of absorbent gauze, retained in place by a bandage when necessary, were applied. In eczema the excoriated areas were either treated in the same way, or they were first powdered with the xeroform and then covered with an indifferent salve or Lassar's paste.

The Treatment of Lupus Erythematosus.—UNNA (*Journ. Cut. and Gen.-urin. Dis.*, October, 1898), in a paper read before the Section of Dermatology, British Medical Association, discusses the treatment of this obstinate disease. He divides the internal remedies in use into two groups: (1) those which exert a favorable influence upon the injurious vasomotor paresis of the face, and (2) those to which a specific action has been attributed. In the first group are alkalies, carbonate of ammonia, ichthyol-ammonia, salicylate of soda, and ergot; in the second are phosphorus, salicin, iodide of starch, iodide of potassium, arsenic, and tuberculin. The author relies, however, more upon external than internal remedies. External remedies may be divided into six groups, as follows: desiccating, compressing, antihyperæmic, necrotizing, inflammatory, and specific (?) remedies. Cautious treatment may begin with the application of bandages of lead-water at night, and a dusting-powder of oxide of zinc, bole, and carbonate of magnesia during the day; or a zinc-sulphur paste with ichthyol or resorcin may be rubbed in at night; or a gelanthum, with ichthyol or soft soap, or both. As the inflammation subsides the indolent patches may be distinguished from the irritable. If the latter show signs of fixed œdema, collodion with soap or ichthyol may be applied; or for dark-red patches the micro-cautery may be used. Indolent patches must be treated more vigorously, using pyroloxin paste or the soap treatment. Before using the soap treatment, strongly hyperkeratotic patches should be peeled off with salicylic soap plaster mull. Patches on the scalp should be thoroughly treated with soft soap and then covered with pyroloxin ointment. In cases of anæmia, flushing of the face, or when there is indigestion, ichthyol may be given internally throughout the treatment.

Injections of Calomel in the Treatment of Lupus.—DU CASTEL (*Annales de Derm. et de Syph.*, 1898, No. 7) presented before the Société Française de Dermatologie et de Syphiligraphie two patients with lupus vulgaris treated with injections of calomel. After the injections a process remotely resembling that following injections of tuberculin was noticed in the diseased areas. The first patient treated presented a slight improvement, but the second showed no appreciable result. After six months' study of the method, Du Castel concludes that treatment of lupus by injections of calomel is only an adjuvant, and that it should be associated with surgical treatment.

Changes in Alkalinity of the Blood in Certain Diseases of the Skin.—M. A. TCHLENORFF (*Wratch*, 1898, xix. p. 248; and *Journal of Cutaneous*

and Genito-urinary Diseases, November, 1898) concludes, from a series of experiments upon miscellaneous cutaneous diseases made in Pospelow's clinic, that in such dermatoses as dermatitis herpetiformis, purpura hæmorrhagica, subacute and chronic eczema, erythema multiforme, pemphigus, lichen rubra, elephantiasis, and psoriasis, the alkalinity of the blood is diminished, and that arsenic does not increase the alkalinity of the blood, and consequently acts upon the skin not by its influence upon the blood, but "in some manner not yet explained." [The action of arsenic upon nerve structure, as explanatory, does not seem to be referred to.]

Erythema Multiforme on the Buccal Mucous Membrane.—TURNER (*Brit. Journ. of Derm.*, November, 1898), at a meeting of the Dermatological Society of London, presented a patient who, after eating freely of oysters, was attacked with severe abdominal pain and diarrhœa, lasting ten days. Simultaneously, the mucous membrane of the lips and gums became very sore, white patches forming. After sixteen days the patient got better, being able to return to his work. Later, a new attack came on, accompanied by the formation of blisters in the mouth, but without gastro-intestinal symptoms. At this time there were also blisters just below the knees, on the wrists, and on the backs of the fingers, and a red rash covered the palms. After a few days the mucous membrane of the mouth was studded with large vesicles or bullæ. On the legs were collapsed, rounded bullæ the size of a sixpence, with some appearance of concentric formation, and on the heel and external malleolus of the other foot were similar lesions. On the wrists were a few vesico-pustules and the remains of bullæ symmetrically distributed.

Eczema.—MALCOLM MORRIS (*Journ. Cut. and Gen.-urin. Dis.*, October, 1898), in answer to the question, What are we to understand by eczema? concludes as follows: It is a disease the most marked clinical characteristic of which is the infinite variety of lesion by which it displays itself, originating in the action of parasites on a skin the resistance of which has been enfeebled by pre-existing disease or structural abnormality or by disordered innervation, sometimes made more intractable by gout and other constitutional states, but having no direct relation to the general health.

Angiokeratoma.—WISNIEWSKI (*Archiv für Derm. und Syph.*, Band xlv., Heft 3) reports two new cases of this affection, and from a study of them concludes as follows: Angiokeratoma is an affection of the skin which attacks the dorsal and lateral surfaces of the hands and feet, and is characterized anatomically by a dilatation of the vessels, increasing from the periphery toward the centre of the efflorescence, where it takes on the character of capillary aneurisms. It generally appears after long-continued and repeated attacks of chilblain. Before the chilblain the fingers and toes are usually cyanotic, blue, and somewhat swollen, so that this period may be regarded as the preliminary, and the chilblain as the second stage, after which the angiokeratoma appears. It occurs in young individuals. Its connection with tuberculosis is doubtful. It may be regarded as a disease endemic in certain districts, since Audry's thirty-four cases all came from

the vicinity of Toulouse, and eight out of the twenty-five cases reported by Escaud came from the same locality.

Xanthoma Glycosuricum.—SCHWENTER-TRACHSLER (*Monatsh. für prak. Derm.*, September, 1898) discusses the subject at length, and concludes that this disease occurs chiefly in middle age, and generally in corpulent persons who are otherwise healthy. Sugar is always to be found in the urine. Men are most frequently affected. Icterus stands in no relation to this disease. The cutaneous lesions are thick, firm, pinhead and pea-sized papules, circumscribed, and embedded in the skin; are yellow on their summits, and have a red base; some of them may be merely red papules. They may remain months or years. The extremities are especially liable to invasion, and where the lesions are numerous they incline to coalesce and to form patches, especially about the elbows. The prognosis is in general favorable, although the lesions tend to recur, but this depends on the glycosuria.

OTOLOGY.

UNDER THE CHARGE OF

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Cylindroma of the Concha.—R. HAUG (*Archiv f. Ohrenh.*, September, 1897) reports the occurrence of cylindroma in the concha of a woman, aged sixty-five years. The tumor, in the course of twelve years, grew from the size of a cherry to that of a pigeon's-egg. Extirpation of the tumor was accomplished by means of scissors and knife. Entire recovery ensued in seventeen days. Haug claims that this is the first instance in which a cylindroma has been reported, with histological proof, as originating in the ear.

Foreign Bodies in the Ear.—R. HAUG (*Deutsche med. Wochenschrift*, February 3, 1898) reports another case illustrative of the evil results of trying to remove a foreign body from the ear by means of forceps and hooks, instead of by syringing. In this case, when the patient was sent to Haug, on the ninth day of the disease, the auditory canal was in a high state of phlegmonous inflammation, the auricle and surrounding region swollen, and the cutis of the osseous part of the auditory canal torn out by the manipulations of an unskilful surgeon, so that the periosteum was exposed. The foreign body, a bean, could by means of a probe be felt firmly embedded, but could not be seen through the swollen and closed canal. As pain in the ear and mastoid increased, and headache, vertigo, nausea, and fever set in, and as it was impossible now to remove the swollen bean through the inflamed and narrowed meatus, the auricle was detached behind and thrown forward, when it was found that the foreign body had been pushed through the mem-

brana tympani into the drum-cavity and rested upon the promontory, where, by reason of the swelling of the bean, from the constant bath of pus in which it lay, it was firmly wedged in the drum-cavity, and was removed only after chiselling off a portion of the osseous canal near the membrana, which liberated the foreign body. Entire recovery took place in about two months. (The *first effort* that any one should make to remove a foreign body from the ear should be by syringing warm water or oil into the external auditory canal, after the physician has assured himself by ocular inspection that a foreign substance is in the ear. If a physician cannot examine an ear with otoscope and speculum, and then syringe the ear, he should let the case alone. Usually syringing is sufficient to remove a foreign substance from an ear; if it is not, *any other effort* with *any kind* of instrument should be made only by an expert.) The importance of a cautious and gentle removal of foreign bodies from the ear is emphasized also by J. M. KERSHAW *Clinical Reporter*, St. Louis, Mo., August, 1897) and all others of experience. LIARAS (*Journ. de Méd. de Bordeaux*, April, 1897; *Archiv f. Ohrenh.*, December, 1897) found two fleas in the ear of a patient in Moure's clinic. He recommends killing the insects with a drop of ether or chloroform on cotton inserted into the ear, before finally syringing them out.

CARETTE (*Annales des Mal. de l' Oreille*, etc., February, 1898) records the case of a young man who, by the accidental discharge of a pistol in his own hands, received the *bullet in his auditory meatus*, where it moulded itself firmly to the walls of the canal near the junction of the cartilaginous with the osseous portion. The only symptom evoked was a mechanical deafness and a slight synovitis of the adjacent maxillary joint. Detachment of the auricle from the osseous canal, after an incision behind it, enabled the operator to remove the impacted bullet by means of gouges and drills. Entire recovery in all respects took place under antiseptic treatment in one month.

Furuncles.—JOUSET (*Nord. Med.*, 1897, No. 58; *Archiv f. Ohrenh.*, December 17, 1897) points out the important fact that in furunculosis of the external ear, careful differential diagnosis must often be made between it and diffuse otitis externa, abscess of the membrana tympani, and even mastoid empyema.

LEUTERT (*Archiv f. Ohrenh.*, November, 1897, No. 23) has described the symptomatology occurring in connection with a peri-auricular abscess ensuing upon the rupture of a furuncle through the cutaneous part of the auditory canal. Such symptoms are of interest because of the differential diagnosis they render necessary between a peri-auricular abscess and abscesses starting in the mastoid.

Hyperostosis of the Auditory Canal.—HARTMANN (*Zeitschr. f. Ohrenh.*, Band XXX.; *Archiv f. Ohrenh.*, December 17, 1897), following Virchow, draws attention to the great difference between diffuse hyperostoses and exostoses of the auditory canal. The former he regards as disturbances of development in the pars tympanica of the temporal bone, whereas exostoses are pathological products.

J. GRUBER (*Austrian Otol. Soc.*, April 27, 1897; *Wiener med. Woch.*, July 24, 1897) found hyperostosis of the auditory canal in connection with a piece

of straw firmly embedded in the membrana tympani. It seems to be a question whether the irritation of the straw produced the hyperostosis.

Two peculiarly-shaped exostoses of the auditory canal near the membrana have been observed by H. A. ALDERTON (*Annals of Otol., Rhin., and Laryn.*, February, 1898), one in a woman aged eighteen years, the other in a man aged forty years. (These were considered gouty products, but their proximity to the termini of the annulus tympanicus would suggest that they were connected with the spina tympanica anterior and the spina tympanica posterior, respectively.) Hyperostoses resembling these are described by POLITZER (*Austrian Otol. Soc.*, April 27, 1897; *Wiener med. Woch.*, July 2, 1897), who attributed them to anomalous development of the free ends of the annulus tympanicus at this point. It is a failure in union between these points and the outer surface of the tympanic process of the squama. G. P. FIELD (*Lancet*, July 3, 1897) believes, with many others, that hyperostosis of the auditory canal is caused by the entrance of cold water into the ear. The dental lathe is recommended by him as the best means for their removal. Prognosis is favorable if they are thus removed. H. KNAPP (*Ann. des Mal. de l'Oreille*, January, 1898) has successfully removed by enucleation an obstructive exostosis from the external auditory canal after detachment of the skin over the bony growth. Immediate relief to the pain in the head and ear from which the patient suffered followed the operation and the wound healed by first intention. There had been a chronic purulent discharge from the ear in this case for twelve years.

Fractures of the Auditory Canal.—V. GALETTI (*Ann. des Mal. de l'Oreille*, April, 1898) points out that the symptoms of an indirect fracture of the external auditory canal are pains in and about the ear, difficulty in chewing and swallowing, epistaxis, otorrhagia, paracousis, deafness, vertigo, loss of consciousness, mydriasis, delirium, and vomiting, thus making difficult the differential diagnosis between such a fracture and fracture of the base of the skull.

Primary Otitis Externa.—C. J. M. SCHMIDT (*Ann. des Mal. de l'Oreille*, January, 1898) describes three forms of primary otitis externa, viz.: 1. The form limited to the epidermis analogous to ichthyosis. 2. An affection of the corium resembling dermatitis when mild, eczema when more severe. 3. An affection of the epidermis only. Much depends upon the prophylaxis, and scratching the ear is sternly forbidden. The hemorrhagic form is nearly always traumatic. H. SCHMALTZ (*Archiv f. Ohrenh.*, November 23, 1897) has observed that otitis externa generally occurs in those whose scalp is affected with seborrhœa and also in those suffering from acne of the face. The ear disease yields when the disease of the scalp is controlled. Therefore, he has named this form of otitis externa, connected with the aforesaid disease of the skin, *seborrhœic otitis externa.*

Burns of the External Auditory Canal and Membrana Tympani.—O. SCHWIDOP (*Archiv f. Ohrenh.*, December 17, 1897) points out the fact that the external auditory canal is often scalded by various domestic remedies,

applied to the ear. The external auditory canal and the membrana tympani are often scalded by the instillation of various alcoholic and ethereal fluids for the cure of toothache.

OPHTHALMOLOGY.

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The Educative Treatment of Convergent Squint.—PRIESTLEY SMITH (Birmingham, England) prefers the term "educative" to "orthoptic" as better indicating the essential idea of this kind of treatment; and he regards it as having parallel importance with the optical and the operative treatment of strabismus. From his study of it he concludes:

Convergent strabisumus is a disorder of innervation in which the visual centres fail to control the act of convergence. This act is thereby degraded. It becomes purely automatic and purposeless. It is excited by the associated act of accommodation. It is excessive because it is uncontrolled.

The failure of control depends largely on faulty development of the visual apparatus. The fault, whether it be in the eye or in the central organs, is frequently hereditary. In many cases the power of control is lost through shock or illness during infancy.

Hyperopia, when of considerable degree, predisposes to strabismus, and sometimes causes it by demanding an abnormal effort of control. Hyperopia of low degree does not account for strabismus in a child.

The disorder is confirmed and perpetuated by suppression of the function of the squinting eye. In treating it we should aim at stopping this habit of suppression and establishing the habit of binocular control.

The means employed in the educative treatment include: 1. The occlusion of one eye by a shade or pad. Usually it is the "good" eye which is occluded to compel the use of the squinting eye, to promote its true fixation, and to improve its visual acuteness. But if it becomes necessary at times to use the "good" eye, the shade should be transferred to the other. For the squinting eye had better be in darkness than continue to form images which the brain does not perceive.

2. Bar-reading—that is, reading with a ruler or something of the kind held between the page and the face, so that a part of each line is hidden from either eye alone, and the two eyes must be used to read the whole of it. This helps the recovery of binocular vision by making the patient conscious

each instant of the deviation, and by compelling the movements necessary to fix with the squinting eye. It is not applicable to very young children.

3. The use of "fusion-tubes" is useful for children who cannot read. These are two tubes each of which has a convex lens in the end held toward the eye, and a shutter with a small hole covered with ground-glass in the other. The distance from the lens to the shutter is the focal distance of the lens. The tubes are connected by chains, so that they can be turned in the direction of the two visual axes in any case of squint. The exercise with them consists in making the two holes appear as one, and in keeping them fused as the direction of the tubes is slowly changed. This cultivates the faculty of binocular fusion.—*Ophthalmic Review*, June, 1898.

[The occlusion of one eye should be confined to cases in which the squint is constant. Interruption of binocular vision may convert an intermittent strabismus or even a heterophoria into an actual or constant deviation.—ED.]

Operative Treatment of Lesions of the Frontal Sinus.—S. S. GOLOVINE (Moscow) holds that when operative treatment is necessary it ought to embrace two conditions, viz., that the cure should be complete and that the patient should not be disfigured by the operation. Curettement through an opening made with a trephine is never satisfactory, because one is not sure that the curettement is complete. Golovine has, in three cases, made an osteoplastic opening into the sinus. A T-shaped incision is made at the inner extremity of the brow through the soft parts. Then a bone flap of the required size is made, convex upward, and with its base corresponding to the inner third of the orbital ridge. Through this the sinus may be thoroughly cleaned out. A drain is put through into the nose, and the bone shutter turned back into place. The drain is to be kept in two months; and at first the wound is washed daily, using hydrogen dioxide.

In three cases he has resorted to cauterizing the interior of the sinus with steam. This may be done through a fistula or through a small trephine opening at the upper inner angle of the orbit. The injection must be of live steam, not of condensed, hot, watery vapor. It should be continued from one-quarter to one-half minute, and may be repeated after several minutes. This is followed by suppuration and slow granulation within the cavity, five or six months being required for its complete obliteration. The post-operative treatment is daily irrigation with hydrogen dioxide. By experiments on dogs it was demonstrated that this treatment was followed by the complete filling of the cavity by bony tissue, which at the end of a year resembled slightly hardened diploë.—*Archives of Ophthalmology*, vol. xxvii., No. 3.

Sympathetic Ophthalmia.—GEO. FERDINANDS (Aberdeen) reports two cases of ophthalmitis occurring long after the enucleation of the fellow eye for injury. In the first case the injured eye was removed, probably several weeks after the injury, the other eye having become "weak." Fourteen years later the patient had the socket operated on, and commenced wearing an artificial eye, but only occasionally. Three years later she was in poor health, and returned with iritis and keratitis punctata. Later she had several relapses, controlled by atropine. She retained vision = 6/XVIII.

The second case was one in which the injured eye was enucleated four days

after injury. Twenty-one years later the patient found the artificial eye gave him pain in the brow, and noticed impaired vision and signs of inflammation in his good eye. When seen several months after this there was well-marked iridocyclitis, the eye was very sensitive to touch, and there was severe neuralgic pain in the brow and temple. Subsequently there were relapses and ulceration of the cornea. Vision was reduced to counting fingers at four feet. The fundus could not be seen.—*British Medical Journal*, June 18, 1898.

CECIL E. SHAW (Belfast), from a study of sympathetic ophthalmia, made under the auspices of the Scientific Grants Committee of the British Medical Association, concludes that since the publication of this theory practically the whole weight of the experimental evidence and the greater portion of the clinical evidence fails to support the migratory theory (migration of germs along the optic nerves) or is actually opposed to it; that it can only stand on the assumption that the migratory germs can neither be inoculated, cultivated, nor stained by any known method. We are obliged to fall back on some form of the old theory, that sympathetic ophthalmia is due, partially if not entirely, to irritation of the ciliary nerves.—*British Medical Journal*, June 18, 1898.

[Ferdinands says that in his cases the symptoms and progress were identical with those of sympathetic ophthalmitis. But these are only the symptoms and progress of a bad irido-cyclitis from other causes. Sympathetic ophthalmitis is not certainly anything more than an irido-cyclitis following injury and similar inflammation of the other eye when this is not enucleated. The connection of the irido-cyclitis with the loss of the other eye by injury in these cases is, therefore, extremely doubtful. Of course, if the essential morbid factor of sympathetic ophthalmitis is a nerve irritation, it is possible that this may be transmitted from other than the ciliary nerves.—ED.]

Anæsthetic and Germicidal Actions of Holocain —R. L. RANDOLPH (Baltimore), from a use of the drug (in a 1 per cent. solution) in fifty-four cases, concludes that it is an effective local anæsthetic. Applied as is cocaine for cataract extractions and iridectomy no difference was observed in the anæsthesia produced by the two drugs. For foreign bodies on the cornea, pterygium, etc., the quickness with which anæsthesia was produced (less than two minutes) was striking. The absence of desiccation of the cornea, dilatation of the pupil, and slight subsequent photophobia render holocain useful for the removal of foreign bodies from the cornea.

From bacteriological experiments Randolph concludes: In solution of the above strength holocain possesses distinct germicidal properties. Exposed to it, pus organisms lose their vitality within twenty-four hours. Exposures of from five to thirty-five minutes showed in every instance a gradually diminishing number of colonies, showing that in those exposures many of the organisms were killed.—*Bulletin of the Johns Hopkins Hospital*, July, 1898.

[The bactericidal power of holocain gives it the advantage that solutions of it will keep themselves sterile without the addition of another germicide. We have no perfectly reliable germicide that can be added to cocain solutions without serious disadvantage, and we must, therefore, depend on heat in sterilizing such solutions.—ED.]

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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OF LONDON.

England's Declining Birth-rate and Marriage-rate.—DR. H. MAY (*Public Health*, September and November, 1898) calls attention to the fact that the birth-rate for the whole of England and Wales fell uninterruptedly from its highest point, 36.3 in 1876, to 30.1 in 1890, and again, with fluctuations, to 29.7 in 1896–1897, and asserts that this fall is proof of a general change in the social habits of the country. Coincidently there has been a considerable but not so pronounced fall in the marriage-rate, which reached its highest point, 17.6, in 1873, then fell during the next six years uninterruptedly to 14.4, and has fluctuated since then between 14.2 and 16, the latter figure being for 1897 and the highest for twenty years. The decline in the birth-rate amounts to over 15 per cent. and in the marriage-rate to 10 per cent., and the latter will account for only part of the former. The balance of the decline in the birth-rate he ascribes to other and unnatural causes. It appears that the registered deaths from premature birth have risen steadily from fourteen per thousand in 1882 to nineteen in 1896, and the deaths from abortion and miscarriage from six to fourteen per million of the population in the last ten years. The great fall in the general death-rate should show a diminished infantile death-rate, but, instead, it appears that the mortality of children under a year shows no decrease. He points out that the changes in the birth-rate and marriage-rate will produce a derangement of the age distribution, causing the proportion living at different age-periods to vary and rendering the number of each at a census an imperfect guide to the following inter-censal years. A part of the fall in the general death-rate is accounted for by the fact that the number of children under five fell from 136 to 122 in 1000 between 1881 and 1891, a diminution which would necessarily affect the general death-rate, inasmuch as the rate at that age period is very high.

The marriage-rate of the country can no longer, he says, be considered as the "barometer of its prosperity," for in the year of highest prosperity during the past twenty years it was but 16, which is no higher than the lowest rate of any of the preceding twenty year periods. He attributes the decline to "an intelligent selfishness produced by modern civilization" and shows that marriage is postponed and early marriages are especially diminished. Marriages under twenty-one years have fallen, in the period 1885–1896, from 81 to 59 per 1000 males, and from 230 to 188 per 1000 females married. The mean age at marriage shows considerable increase, and this

increase is steady. There is a general increase in the age of marrying bachelors, a smaller one in that of spinsters, a considerable one in that of marrying widows, but a slight decrease in that of widowers. The increase in the number of marriages of persons over thirty years of age amounts to 94 per 1000.

Infection from the Hands of Tuberculous Persons.—Dr. E. R. Baldwin (*Philadelphia Medical Journal*, December 3, 1898), while conceding that the danger from a few tubercle bacilli on the fingers is very slight, draws attention to the scant mention of that mode of infection in the abundant literature of the subject. With the object not so much to determine the degree of danger from infected hands, as to note the differences in respect of the presence of bacilli on the hands of tuberculous patients who use handkerchiefs for the reception of sputa and those using cuspidors or cloths, he instituted a series of experiments in which he washed the fingers of twenty-eight persons in whose expectorations tubercle bacilli were known to exist. Ten of these were private patients, half of whom used cuspidors and occasionally handkerchiefs, and the other half either cuspidors or cloths; the others were sanitarium patients who used cuspidors only. The patients had no knowledge in any case that the tests were to be made, and the time that had elapsed since the last previous washing varied from ten minutes to twelve hours. The washings from the ten private patients and from five of the others were used to inoculate guinea-pigs, two of which were taken for each case. In eight of the ten private cases one or both of the pigs became tuberculous; in the other two the results were entirely negative, and it deserves to be noted that the two patients concerned were scrupulously careful to keep their hands from becoming soiled. In two of the five sanitarium cases, one pig in each was found to be tuberculous. The washings from the other thirteen were centrifugated and examined microscopically, and in three of the sediments the bacillus was found.

In conclusion he submits the following points:

1. Living tubercle bacilli are not infrequently present on the hands of patients who are not careful in the use of handkerchiefs, cloths, and even cuspidors when the expectoration is abundant.

2. No precaution against contamination of the hands can avail better than the use of cuspidors combined with frequent ablutions with soap and water.

3. With the present usage of society, people are not likely to use pocket-cuspidors, except in institutions. Consequently, handkerchiefs will be used in public, especially as anti-spitting laws are forcing individuals to use them. There is, therefore, urgent necessity for a cheap, comparatively impervious and soft handkerchief that can be burned.

Germicidal Action of Alcohol.—Dr. Rafael Minervini (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxix., October 25, 1898) was experimenting with alcohol as a disinfectant when Epstein's results were published (see this Journal, September, 1898). As his results were not in entire agreement with these, he undertook the whole investigation over again and enlarged its scope. His published conclusions are as follows: Alcohol has

in general a very slight germicidal action. At normal temperatures it may kill non-spore-bearing bacteria, but not the spore-bearers. Its action is strongest in 50 to 70 per cent. strength and weakest when in strongest concentration (absolute alcohol). When boiled, or heated under pressure, it acts according to its percentage of contained water. Alcoholic solutions of disinfectants have less effect than the corresponding aqueous solutions, and their germicidal power varies inversely as the strength of the alcohol in which they are dissolved.

Physiological Action of Copper in Foods.—The widely different opinions of the importance of copper in foods led BAUM and SEELIGER (*Zeitschrift öffentl. Chem.*, 1898, through *Zeitschrift für Untersuchung der Nahrungs und Genussmittel*, July, 1898) to carry on a series of experiments on the subject that extended over three years. The questions at issue were as to chronic poisoning, the elimination of copper in the milk, its deposition in the fœtus, and the comparative poisonous influence of the several copper compounds, the intensification of the influence by increased doses, and the pathological changes in the different organs.

The conclusions reached were as follows: Copper taken by the mouth is, as a rule, not eliminated in the milk; occasionally it appears in small traces, and very exceptionally in weighable amounts. The milk of animals that had been dosed for a long time exerted no perceptible deleterious effects when fed to others, even when it constituted the sole food. Absorbed into the system from the alimentary canal, the metal enters the fœtus in comparatively large amounts and is stored in its organs. Given in small daily doses it is almost wholly absorbed and in great part again eliminated, but the administration of larger amounts is not followed by increased absorption; on the contrary, absorption is not infrequenly lessened. Thus absorption and elimination appear to go on with no fixed rules. Elimination by bile and pancreatic and intestinal juices may be extended as much as five months after the administration of the last dose, and it may be complete in from four to five weeks. Long-continued administration of small doses may produce a true chronic poisoning. The several preparations possess different degrees of toxicity. The most poisonous is the oleate, then the acetate, then the sulphate, and lastly cuprohæmol, which, even in very large doses, produces hardly a perceptible effect.

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